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## POLICY RESEARCH WORKING PAPER

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# Regional Economic Integration and Agricultural Trade

*Junichi Goto*

The greater the initial level of protection, and the lower the degree of product differentiation, the greater an impact regional integration will have — so regional integration will have more impact on agricultural trade than on manufacturing.



## Summary findings

Goto analyzes the economic impact of regional integration on agricultural trade. Using a simple Krugman-type model with product differentiation, he derives two propositions about regionalism's impact on trade flows:

- The higher the degree of pre-integration protection, the greater the impact of regional integration.
- The lower the degree of product differentiation, the greater the impact of regional integration.

Taken together, the two propositions predict that regionalism has more impact on agricultural trade than on manufacturing, because the initial level of protection is higher and the degree of product differentiation is lower for agricultural products.

He tests these propositions against actual data for two incidents of EC expansion: Greece's admission to the European Community in 1981 and that of Spain and Portugal in 1986. The data generally support the theory.

After the theoretical and *ex post* analysis, Goto applies the model to examine the possible *ex ante* impact of the APEC free trade agreement on Japanese rice imports, an issue on which (despite heated emotional debates) there have been no major studies.

It is the popular belief in Japan that when the Japanese rice market is liberalized, Japanese rice production will be wiped out. Goto's simulation results suggest that the impact of partial liberalization of Japan's rice market would be relatively minor, but total liberalization would have a profound impact on Japanese rice production.

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This paper — a product of the Commodity Policy and Analysis Unit, International Economics Department — is part of a larger effort in the department to. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Grace Ilogon, room N5-032, telephone 202-473-3732, fax 202-522-3564, Internet address [gilogon@worldbank.org](mailto:gilogon@worldbank.org). August 1997. (60 pages)

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## **Regional Economic Integration and Agricultural Trade**

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## ***I. Introduction***

Since the late 1980s, we have observed the emergence of a new regionalism in various parts of the world. Europe has a long history of regionalism. Ever since the European Economic Community (EC) was established in 1958, it has expanded its membership and deepened the degree of integration. In 1973, the union of the original six members admitted three former EFTA members, i.e., Denmark, Ireland, and the United Kingdom, as new members. Greece joined the EC in 1981, and Spain and Portugal were admitted in 1986. During these period, the European integration deepened, too. In 1968, the EC formed a customs union, and the controversial common agricultural policy (CAP) was initiated. The degree of integration in Europe was further increased in early 1990s when the EC countries tried to form a single market by lifting various obstacles to the movement of goods and services within the region. This fairly successful attempt is known as "EC92." Recently, the European Union admitted Austria, Finland, and Sweden as new members, and the Union is also moving toward monetary integration.

In North America, Canada and the United States have a long history of strong economic ties. As early as 1965, the two countries signed the Canada-United States Automotive Products Agreement, which enabled nearly free movement of motor vehicles and parts between the two countries. The Canada-United States Free Trade Agreement (CUFTA) was signed in 1988 and put into effect the following year. Mexico also wanted to have closer economic ties with the U.S., and President Salinas of Mexico and President Bush of the U.S. agreed in 1990 that a free trade agreement between the U.S. and Mexico would substantially benefit the economies of the two countries. Since Canada did not want to be left behind, she tried hard to be included into the

new U.S.-Mexican agreement. As a result, the North American Free Trade Agreement (NAFTA) was signed in December 1992. After overcoming some opposition in the U.S. Congress, NAFTA was put into effect in January 1994. Under NAFTA, Canada, Mexico, and the United States agreed to abolish tariff and nontariff barriers in the region by the year 2009.

In contrast to the development in Europe and North America, there have been few attempts to form free trade areas in Asia until recently. While Indonesia, Malaysia, the Philippines, Singapore, and Thailand were united into the Association of South East Asian Nations (ASEAN) in 1967, the union started as an anti-communist, political and military association rather than an economic bloc. However, in the 1990s, attempts to form economic unions have become common in Asia, too. In 1990, Premier Mahathir of Malaysia advocated that Asian countries, including Japan, form their own economic bloc, such as the East Asian Economic Caucus (EAEC), to counter balance possible adverse effects of economic integration outside of Asia. This plan did not please the United States or other Asian countries which are heavily dependent upon their exports.

Another alternative considered by the Southeast Asian nations was to form more open regional union consisting of broader membership, such as the Asia Pacific Economic Cooperation (APEC). The United States supports the formation of a broader regional union that would include non-Asian countries such as Australia and New Zealand, and notably, the United States itself. In fact, as manifested in the Bogor Declaration of 1994, APEC members agreed to achieve free and open trade and investment in Asia and the Pacific by 2010 for industrialized countries and by 2020 for developing countries. In November 1996, the eighteen APEC members gathered in Manila and presented individual action plans to achieve this goal.



In view of the increased importance of regionalism in the world economy, the purpose of this paper is to examine the *ex post* and *ex anti* effects of regional integration on international trade flows. The paper will focus on agricultural trade, because, as shown below, the impact of regional integration on agricultural trade has often been much stronger than on manufacturing trade.

In Section II, the salient features of agricultural trade will be examined in comparison with manufacturing trade. Generally speaking, international flows of agricultural goods are more heavily protected by tariff and nontariff barriers than those of manufacturing goods. In addition, we argue that, contrary to popular belief, agricultural trade is far from the flow of homogeneous products. While the degree of product differentiation of agricultural goods on the whole is probably smaller than that of manufacturing goods, some agricultural goods are highly differentiated, and therefore, any attempt to measure the degree of impact of regional economic integration under the assumption of homogeneous product seems to be misleading.

In Section III, we develop a simple model for the analysis of the impact of regional economic integration on agricultural trade flows. We develop a simple Dixit-Stiglitz-Krugman-type product differentiation model with tariff distortions because it captures more realities of agricultural trade than a homogeneous product model for various reasons discussed below, and therefore it gives deeper insights into the likely effect of regional economic integration on agricultural trade flows. Using the model, we derive two intuitively appealing propositions: (a) *the impact of regional integration is stronger when the degree of pre-integration protection is higher; and (b) the impact is stronger when the degree of product differentiation is lower.* Taken together, these propositions suggest that *regional integration has a stronger impact on*

*agricultural trade than on manufacturing trade, because, in general, trade barriers on agricultural products are higher and the degree of product differentiation is lower for agricultural trade*, in comparison with manufacturing goods.

In Section IV, the validity of the two propositions is tested against the actual data, taking two incidents of the EC expansion as examples, i.e., the admission of Greece in 1981 and of Spain and Portugal in 1986. We examine whether agricultural trade was more strongly affected than manufacturing trade after these two incidents of progress toward regional integration in Europe. As discussed in detail below, *the intra-regional trade in agricultural products increased sharply after 1981 and 1986, although such a jump cannot be observed for manufacturing trade*. Further, a careful examination reveals that trade flows of some agricultural products were more strongly affected than others, depending on the magnitude of initial trade barriers and the degree of product differentiation.

In Section V, the model developed in Section III is applied to the examination of a possible *ex ante* impact of regional integration. In view of the fact that APEC countries are actively attempting to realize a free trade regime, we also evaluate the likely impact of future liberalization of agricultural trade under the framework of the APEC free trade agreement. One of the most controversial commodities, rice in the Japanese market, will be used in the calibration exercise as an example.

Section VI summarizes the major findings of the paper, and proposes an agenda for future research.

## II. Salient Features of Agricultural Trade

Before doing *ex post* and *ex ante* analysis of the impact of regional economic integration on trade flows, let us briefly examine the salient features of agricultural trade, in comparison with manufacturing trade. As discussed in detail below, generally speaking, agricultural trade is characterized by two important features: (a) agricultural trade is subject to heavier trade restrictions (both tariff and nontariff barriers) than manufacturing trade; and (b) agricultural product is also far from homogeneous, although the degree of differentiation is generally lower than that of manufacturing trade.

### (A) Heavy Protection

As shown in Table 1, trade barriers imposed on manufacturing trade, perhaps with the exception of textiles and clothing, have been greatly reduced through a series of tariff negotiations under GATT, and as of 1989, the average tariffs of advanced countries on manufacturing trade (MFN tariffs) are minimal at 3-6 percent. Tariff rates imposed on

Table 1: Average MFN Tariffs on Manufactured Goods  
(percent)

	1962	1970	1989
European Community	11	8	6
France	11	8	6
Germany	11	8	6
Netherlands	11	8	6
United States	12	9	5
Japan	16	12	3

Source: Pohl and Sorsa (1992), p. 13.

agricultural products, however, are much higher. Table 2 lists the post-Uruguay Round tariff rates by commodity. Tariff rates on agricultural goods (see "Agriculture, exc. Fish: Estimate 2" in the table) are 7.6-18.5 percent). In addition to tariff protection, agricultural goods are also heavily protected by various nontariff barriers. For example, until very recently, Japan imposed

Table 2: Binding and Levels of MFN Tariff Rates Before and after the Uruguay Round (percent)

Summary product category	Levels and changes weighted by imports from: the world excl. FTA <sup>1</sup>		
	Post-UR applied rate	Tariff reduction <sup>2</sup>	Post-UR bound rate
Agriculture, excl. fish: estimate 1	25.0	32.4	32.4
Agriculture, excl. fish: estimate 2	7.6	4.5	18.5
Fish and fish products	4.4	4.4	5.2
Petroleum oils	1.7	1.5	3.1
Wood, pulp, paper and furniture	1.2	5.1	2.2
Textiles and clothing	9.8	3.1	12.4
Leather, rubber, footwear	6.4	3.1	7.8
Metals	2.9	4.3	4.1
Chemical & photographic supplies	4.8	5.1	7.3
Transport equipment	6.0	3.3	6.9
Nonelectric machinery	3.7	3.6	5.1
Electric machinery	4.6	4.0	5.7
Mineral prod., prec. stones & metal	1.6	2.8	2.6
Manufactured articles nes.	2.8	4.1	4.1
Industrial goods (lines 5-14)	4.2	3.9	5.7
All merch. trade (lines 2-14)	4.3	3.9	6.5

Notes: 1. Value of imports from partner countries that do not participate in free trade agreements with the world.

2. Weighted average tariff reduction measured by  $dT / (1 + T)$  in percent.

3. Average based on the 40 GATT members.

Source: Finger, Ingco, Reincke (1996).

an almost total ban on rice imports. In the European Community, most of the agricultural products are heavily protected by the infamous Common Agricultural Policy (CAP).<sup>1</sup> As a result, the tariff equivalency of such nontariff barriers on agricultural trade is very high. The numbers for "Agriculture exc. Fish: Estimate 1" in Table 2 show a combined rate of external barriers (i.e., tariff plus tariff-equivalency of nontariff barriers), of 25.0-32.4 percent. Further, as Table 3 shows, external protection rates for certain agricultural product are very high. The tariff equivalency is more than 100 percent in some cases.

Table 3: EC Agricultural Protection and Trade Patterns, 1989  
(percent)

SITC code	Tariff-equivalent of protection and subsidies
01 Meat	6-270
02 Dairy products	0-200
03 Fish	0-30
04 Cereals	20-130
05 Vegetables and fruit	0-30
06 Sugar	180
07 Coffee, tea, spices	0-18
08 Animal foodstuffs	0-50

Source: Pohl and Sorsa (1992), p. 22

### ***(B) Some Evidence of Product Differentiation***

Contrary to the popular belief that agricultural trade is an international exchange of

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<sup>1</sup> There are many detailed discussions of CAP in the literature, including Pohl and Sorsa (1992), on detailed discussion of CAP.

homogeneous commodities, there is some evidence that agricultural trade is differentiated. Note that under the traditional Heckscher-Ohlin framework, all goods are treated as homogeneous products (e.g., a car is a car). However, after many distinguished economists, including Dixit, Helpman, and, most notably, Krugman, noticed that international trade can be generated by increasing returns to scale and product differentiation, people came to believe that most manufacturing goods are more or less differentiated (e.g., a Japanese car is differentiated from an American car). But, agricultural products have continued to be regarded as homogeneous, and therefore the assumption has been that consumers only care about its price.

However, there are several reasons to believe that agricultural products are also differentiated, as discussed in detail below. While manufacturing products are generally more strongly differentiated than agricultural products, some agricultural goods (e.g., rice in the Japanese market) are more differentiated than some manufacturing goods (e.g., cotton yarn).

#### **(i) Apples and oranges as the same product**

When we analyze trade statistics, or any statistics for that matter, using available data, we are observing data which are aggregated at least to some extent. For the analysis of international trade, we often use trade flow data classified according to the SITC. Many studies, including the present paper, rely on the 2-digit or 3-digit SITC data. As discussed in detail below, this kind of aggregation makes it all the more important to analyze the data under the framework of product differentiation assumption rather than homogeneous product assumption.

Note that the degree of product differentiation depends on how we define the product. If we define the product with sufficient disaggregation, almost any product can be treated as a

homogeneous product. To better understand this point, let us take a passenger car, a typical differentiated product, for example. Obviously, Ford Escort and Porche are quite differentiated from each other, and consumers do care about the product differentiation. Although the price of the latter is substantially higher than that of the former, some consumers buy the expensive Porche. However, if we define a product with sufficient disaggregation as, say, "new 1997 white 2-door Ford Escort LX with automatic transmission, power steering, air conditioning, etc., which has complete 3-year bumper-to-bumper warranty by Ford Motor Company, and which is delivered to New Haven, Connecticut on April 10, 1997," then, it can be regarded as an almost homogeneous product. In this case, consumers do not care about which particular unit of the product they are buying, and would buy any unit which is cheaper than other units.

Similar things can be said about agricultural products. When we look at trade flow data at the SITC 1-digit, 2-digit, or 3-digit level, as most studies do, we are looking, for example, at the product of "food and live animals (SITC 1-digit)," "fruits and vegetables (SITC 2-digit)," or "fresh fruits and fresh or dried nuts (SITC 3-digit)." In other words, in any of the above three classifications, "apples" and "oranges" fall in the same product category. It is only when we define the product at SITC 4-digit level that apples and oranges become different products. Even when we disaggregate the product in such detail, a certain variety of apple can command a much higher price than other apples, because consumers do care which variety of apples they are buying. In fact, even at the SITC 5-digit level, long-grain Indica rice is treated as the same product as short-grain Japonica rice. The same applies to other agricultural products.

Thus, the popular belief that manufacturing goods are differentiated but agricultural goods are homogeneous is fairly misleading. Both goods are more or less differentiated. The

only difference is the degree of differentiation, which varies from product to product and which depends on the degree of disaggregation when a product is defined.

**(ii) Real examples, including rice in Japan**

Rice in the Japanese market is a typical example of how differentiated certain agricultural products can be. As discussed in detail in Section V below, the Japanese rice market has been very much closed to foreign rice except for certain emergency imports. Until the Uruguay Round agreement was put into effect in 1995, Japan imposed an almost total ban on foreign rice, and even after 1995 foreign rice is imported only up to the minimum access level (4 percent of domestic consumption in 1995, which is to be gradually increased to 8 percent by the year 2000).

Almost all rice sold in Japan is similar to the short-grain, Japonica-type rice grown in Japan, and most foreigners, and even many Japanese, will not be able to tell the difference. In spite of such apparent similarity, however, rice is generally highly differentiated in the eyes of Japanese consumers. At the Japanese rice exchange market, prices are quoted according to brand and production sites. Table 4 shows a *partial listing* of prices of various brands of rice at the Japanese rice exchange market in 1995. While in the 1960s and 1970s the majority of rice was distributed through government channels, nongovernmental rice distribution has become increasingly popular over time; its share in total rice distribution in 1995 was 70.2 percent. Table 4, prepared by the Japanese Ministry of Agriculture and Fishery, shows 62 listings (a partial listing) of brands distributed through nongovernmental channels. While prices for these brands are substantially higher than those for standard government rice (16,392 yen per 60 kilograms), the price varies from one brand to another. Generally speaking, *Koshihikari* brands



Table 4: Prices of Various Brands of Rice in Japan, 1995  
(percent)

Production Site	Brand	Benchmark Price (yen/60kg)	
		in Tokyo	in Osaka
Niigata	Koshihikari	22,087	24,863
Toyama	Koshihikari	22,885	22,772
Ishikawa	Koshihikari	22,748	22,736
Fukui	Koshihikari	-	22,640
Hyogo	Koshihikari	-	22,482
Shimane	Koshihikari	-	22,312
Fukushima	Koshihikari	22,634	-
Tottori	Koshihikari	-	22,018
Nagano	Koshihikari	21,905	21,883
Fukuoka	Koshihikari	-	21,949
Kumamoto	Koshihikari	-	21,755
Shiga	Koshihikari	-	21,680
Mie	Koshihikari	-	21,718
Ibaragi	Koshihikari	21,808	-
Okayama	Koshihikari	-	21,479
Tochigi	Koshihikari	21,705	-
Kagawa	Koshihikari	-	21,313
Chiba	Koshihikari	21,640	-
Gifu	Koshihikari	-	21,062
Aichi	Koshihikari	-	21,041
Miyagi	Sasanishiki	21,980	22,157
Akita	Sasanishiki	21,319	21,363
Fukushiima	Sasanishiki	21,273	-
Yamagata (Shonai)	Sasanishiki	21,208	21,302
Iwate	Sasanishiki	21,168	21,116
Yamagata	Sasanishiki	20,878	20,928
Kumamoto	Hinohikari	-	20,936
Oita	Hinohikari	-	20,584
Saga	Hinohikari	-	20,476
Fukuoka	Hinohikari	-	20,501
Ibaragi	Kinuhikari	21,550	-
Shiga	Kinuhikari	-	20,571
Fukuoka	Kinuhikari	-	20,400
Iwate	Hitomebore	21,696	21,779
Miyagi	Hitomebore	21,696	21,779
Fukushima	Hitomebore	21,696	-
Fukushima	Hatsuhoshi	20,765	20,810
Tochigi	Hatsuhoshi	20,608	-
Chiba	Hatsuhoshi	20,180	-

Akita Iwate	Akitakomachi Akitakomachi	21,741 21,025	21,859 20,877
Yamagata	Hananomai	20,304	20,394
Fukui	Fukuhikari	-	20,501
Tottori	Yamahikari	-	20,558
Yamaguchi	Yamahikari	-	20,345
Shiga Hyogo	Nihonbare Nihonbare	- -	20,109 20,125
Okayama	Asahi	-	21,222
Gifu	Hatsushimo	-	21,068
Niigata	Yukinosei	20,819	21,031
Ishikawa	Notohikari	-	21,007
Niigata	Echigowase	20,863	20,804
Aomori	Tsugaruotome	20,357	20,393
Aomori	Mutsukaori	20,371	20,413
Niigata	Niigatawase	20,119	20,150
Niigata	Todorokiwase	19,981	19,946
Yamaguchi	Yamahoushi	-	19,871
Okayama	Akebono	-	19,901
Hokkaido	Kirara-397	19,501	19,652
Aomori	Mutsuhomare	19,059	18,803
Hokkaido	Soraiku-125-Go	18,565	18,797
Haokkaido	Yukihikari	18,588	18,767
Standard	Rice	16,392	16,392

Source: Japanese Ministry of Agriculture and Fisheries.

command the highest price (around 21000-25000 yen per 60kg). Further, *Koshihikari*-brand, rice produced in certain areas command much higher prices than those produced in other areas. *Koshihikari* rice produced in *Uonuma*, a tiny city in Niigata Prefecture, is considered to be the best of the best. Table 5 shows the difference in such rices in 1996. As shown in the table, *Koshihikari* rice produced in Niigata Prefecture is 55 percent more expensive than standard government rice, and the price of *Uonuma-Koshihikari* rice is almost double of that of standard

Table 5: Price of Japanese Rice, 1996

Brand name	Price (yen/60kg)	Index (standard=100)
Uonuma Koshihikari	31,779	194
Niigata Koshihikari	25,359	155
Standard Domestic	16,392	100

Source: Japanese Ministry of Agriculture and Fisheries.

rice. Thus, Japanese consumers perceive a high degree of product differentiation in rice and are willing to pay a huge premium on a certain brand of rice.

The emergency rice import in 1993-94 is another example of how rice is differentiated in the eyes of the Japanese consumers. The summer of 1993 in Japan was unusually cool and the rice harvest that year was only 74 percent of the normal harvest. To cope with a possible food shortage, the Japanese government decided to import 2.59 million tons of rice from Australia, China, Thailand, and the United States. However, Japanese consumers did not like the idea to purchase foreign rice. Housewives waited patiently for several hours in line to obtain scarce domestic rice even though foreign rice was readily available at a cheaper price. Faced with the unpopularity of foreign rice, the government sold it as a package with domestic rice. In other words, consumers were forced to buy a certain amount of unwanted foreign rice in order to buy the domestic rice they really wanted. In spite of such a desperate effort by the government to sell foreign rice, about 1 million tons (or 38 percent) of the imported rice remained unsold, and the government was obliged either to ship it back to foreign countries as food aid to the poor under official development assistance (ODA), or to feed it to animals.

### (iii) Intraindustry trade in agriculture

If the product in question is purely homogeneous, international trade in the product should theoretically be one-way trade. As described in a traditional textbook of international trade theory, for example, Portugal exports wine to England, and England exports cloth to Portugal in return. However, a brief look at actual trade flow data reveals that agricultural trade, as well as manufacturing trade, is far from one-way trade.

To examine the magnitude of intraindustry trade, we calculated intraindustry trade indices, which were first used by Grubel and Lloyd (1975) for agricultural and manufacturing trade in Europe. As in Grubel and Lloyd, the intraindustry trade index of the  $i$ -th industry product ( $ITI_i$ ) is defined as

$$(1) \quad ITI_i = \left\{ 1 - \frac{|X_i - M_i|}{X_i + M_i} \right\} \times 100 ,$$

where  $X_i$  and  $M_i$  are the value of exports and the value of imports, respectively, of the  $i$ -th industry good. Suppose that good  $i$  is a passenger car, and the value of export of passenger cars from Germany to France is 2 billion ECUs, and the value of import of passenger cars by Germany from France is 1 billion ECUs. Then the intraindustry trade index of passenger cars between France and Germany is calculated as

$$(2) \quad ITI = \left\{ 1 - \frac{|2 - 1|}{2 + 1} \right\} \times 100 = 66.7 .$$

If there is no intraindustry trade, or, for example, the United States exports 2 billion dollars worth of grain to Japan but does not import grain from Japan at all, then the index becomes zero. On the other hand, if import values and export values coincide, the index becomes 100. So a higher *ITI* value means that the degree of intraindustry trade is higher.

Keeping the above formula in mind, let us look at Table 6, which summarizes intraindustry trade indices for agricultural trade and manufacturing trade in Europe, which were calculated by using formula (1). The indices vary from one combination of countries to another, but two things are noteworthy. First, intraindustry trade indices of agricultural trade are far from zero (note that if agricultural goods were completely homogeneous, the indices would all have become zero). For example, in the table, the *ITI* of agricultural products between Great Britain and Portugal is as high as 97.8, which means exports and imports almost completely overlap. A simple *ITI* average of agricultural trade between these two countries is 76.3. Second, intraindustry trade indices of manufacturing products are generally a little higher than those of agricultural goods. A simple *ITI* average for manufacturing trade is 86.1, higher than the 76.3 for agricultural trade.

Taken together, Table 6 suggests that agricultural trade should also be analyzed under the framework of product differentiation rather than that of homogeneous product, although the degree of product differentiation of agricultural products is, on average, a little lower than that of manufacturing goods.

e 6: Intraindustry Trade Index, 1995

AGRICULTURE

	BLX	DNK	GER	FRA	ITA	IRL	GBR	NLD	GRC	ESP
Belgium-Luxemburg										
Denmark	80.1									
Germany	89.9	60.5								
France	87.2	61.9	79.9							
Greece	69.3	27.2	94.2	53.9						
Ireland	48.4	60.4	11.9	37.7	35.2					
Great Britain	81.4	35.7	68.3	85.1	96.2	68.4				
Netherlands	81.6	72.7	63.6	72.0	29.5	52.2	57.3			
Portugal	34.7	9.1	94.0	39.3	58.7	12.9	82.0	18.1		
Spain	93.1	58.6	56.3	88.8	65.9	30.1	96.4	82.3	62.2	
Portugal	89.6	46.0	86.2	68.0	80.9	28.3	97.8	80.5	56.0	56.6

SIMPLE AVERAGE = 76.3

MANUFACTURING

	BLX	DNK	GER	FRA	ITA	IRL	GBR	NLD	GRC	ESP
Belgium-Luxemburg										
Denmark	64.6									
Germany	94.1	80.6								
France	93.0	90.2	94.0							
Greece	81.8	60.3	99.9	92.2						
Ireland	36.0	73.1	72.8	53.1	52.6					
Great Britain	95.2	91.5	77.5	89.1	92.4	90.5				
Netherlands	90.6	66.9	84.0	96.6	77.6	62.3	92.9			
Portugal	20.9	46.2	55.6	40.0	21.3	21.6	46.5	19.9		
Spain	76.5	81.4	81.2	98.0	80.4	46.5	90.5	75.7	31.0	
Portugal	71.0	46.7	96.6	92.1	38.8	71.3	93.2	74.8	45.5	65.3

SIMPLE AVERAGE = 86.1

Source: Author's calculations using United Nations Trade Statistics.

### III. Regional Integration and Agricultural Trade – A Theory

#### (1) The General Model

In what follows, a simple model will be developed to perform *ex post* and *ex ante* analyses of the impact of regional economic integration on trade flows of agricultural products.

In the model, the situation of a representative country  $k$  ( $k=1,2,3,\dots,M$ ) is as follows.

Consumers possess the individualistic social utility function ( $U_k$ ) in which

$$(1) \quad U_k = \left[ \sum_{i=1}^N C_{ik}^\beta \right]^{\frac{1}{\beta}}, \quad 0 < \beta < 1,$$

where  $C_{ik}$  is the amount of consumption of the  $i$ -th differentiated product in country  $k$ , and  $N$  is the number of types of differentiated products available to consumers. Some of the differentiated products are domestically produced while others are imported.

Consumers maximize their utility subject to the budget constraint

$$(2) \quad \sum_{i=1}^N P_{ik} C_{ik} = Y_k,$$

where  $P_{ik}$  is the domestic price (i.e., tariff-inclusive price) of the  $i$ -th differentiated product in country  $k$ , and  $Y_k$  is the national income of country  $k$ .

From the utility maximization, we obtain the inverse demand functions

$$(3) \quad P_{ik} = \frac{C_{ik}^{\beta-1} Y_k}{Z_k},$$

$$(4) \quad \text{where } Z_k = \sum_{i=1}^N C_{ik}^\beta.$$

From (3), the elasticity of demand for the  $i$ -th differentiated product ( $\epsilon_{ik}$ ) is

$$(5) \quad \epsilon_{ik} = \frac{1}{(1-\beta) + \frac{\beta C_{ik}^\beta}{Z_k}}.$$

If we assume, following Krugman (1979) and Dixit and Norman (1980), a large number for  $N$  and the symmetry of each differentiated product, we can neglect the second term of the denominator on the right-hand side, and (5) reduces to

$$(5)' \quad \epsilon = \frac{1}{1-\beta} .$$

In equation (5)' we omit the subscript  $i$  and  $k$  for  $\epsilon$  because the demand elasticity turns out to be identical for all products due to the assumptions of symmetry and the large number for  $N$ .

The producer of the  $i$ -th differentiated product in country  $k$  is characterized by the cost function

$$(6) \quad TC_{ik} = W_k F + W_k m \left( \sum_{j=1}^M C_{ij} \right) ,$$

where  $TC_{ik}$  and  $W_k$  are, respectively, total cost of the  $i$ -th producer and wage rate in country  $k$ , and  $m$  is the labor input requirement per unit of output, while  $F$  is a fixed labor input necessary for any positive amount of production. Due to the fixed cost  $W_k F$ , the production technology exhibits increasing returns to scale. The producer maximizes the profit function

$$(7) \quad \pi_{ik} = \sum_{j=1}^M \frac{P_{ij}}{1+t_{ij}} C_{ij} - [W_k F + W_k m \left( \sum_{j=1}^M C_{ij} \right)] ,$$

where  $\pi_i$  is the profit of the  $i$ -th producer, and  $t_{ij}$  is the tariff rate imposed by country  $j$  on the  $i$ -th differentiated product. When country  $j$  is the home country, the tariff rate is zero. From the profit maximization, we obtain the following pricing rule for the  $i$ -th producer in country  $k$ , facing a demand curve with elasticity  $1/(1-\beta)$  as

$$(8) \quad P_{ij} = \frac{W_k m (1+t_{ij})}{\beta} .$$



Further, we assume free entry and free exit. Therefore, the profit of each existing firm is forced to zero in equilibrium. Hence, in equilibrium, we have

$$(9) \quad \pi_{ik} = \sum_{j=1}^M \frac{P_{ij}}{1+t_{ij}} C_{ij} - [W_k F + W_k m (\sum_{j=1}^M C_{ij})] = 0 \quad .$$

Applying Shepard lemma to equation (6), the demand for labor input by the  $i$ -th producer ( $l_i$ ) is obtained as

$$(10) \quad l_i = F + m \sum_{j=1}^M C_{ij} \quad .$$

The domestic labor supply ( $L_k$ ) is assumed to be constant, and in equilibrium we have

$$(11) \quad \sum_{i=1}^{N_k} l_i = L_k \quad ,$$

where  $N_k$  is the number of firms in country  $k$ .

The tariff revenue is distributed to domestic consumers in a lump-sum fashion. Hence, the national income consists of factor payments and tariff revenues as in

$$(12) \quad W_k L_k + \sum_{i=N_{k+1}}^N \frac{t_{ik}}{1+t_{ik}} P_{ik} C_{ik} = Y_k \quad .$$

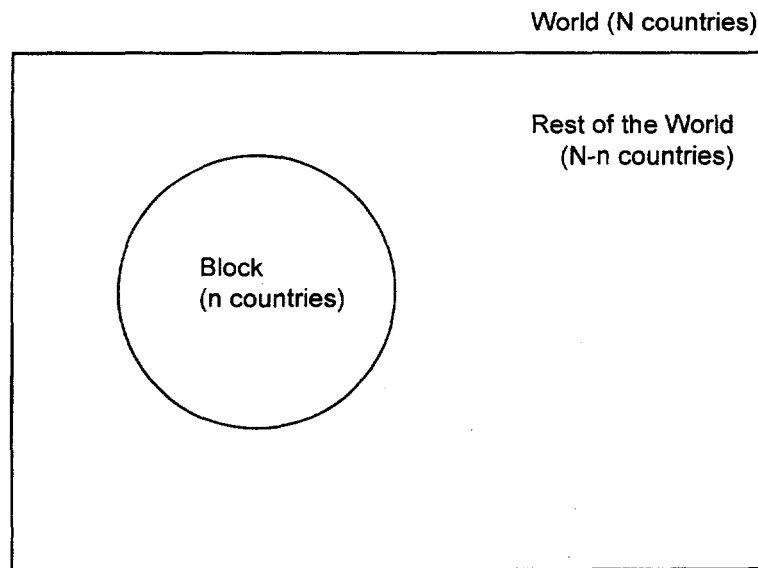
The above model is complete, and the above specification gives equilibrium conditions for a representative country  $k$ . We can solve the model, which consists of  $M$  countries, once the values of the parameters ( $m, F, \beta, t_{ik}, L_k, M$ , and  $N$ ) are identified. Note that this general model can accommodate not only any number of countries ( $M$ ) and commodities ( $N$ ) but also the differences in country sizes  $L_k$  and tariff rates ( $t_{ik}$ ).

## **(2) Determinants of the Impact of Regionalism on Trade**

Let us examine the impact of regional economic integration on trade flows, using the framework developed above. While we will later use the above general model for a simulation

exercise which accommodates other realities such as quality differences between domestic rice and imported rice, in this section we will use a little simpler framework to keep the theoretical analysis manageable. In this section, the world is assumed to consist of a large number  $N$  of identical countries, of which  $n$  countries form an economic bloc while other  $(N-n)$  countries are left out. Trade within the bloc is subject to no tariffs, while other trade is subject to a constant tariff  $t$ . Figure 1 shows the basic framework of analysis in this section. Since all countries are assumed to be identical, without loss of generality, each country is assumed to produce one unit of a type of differentiated product.<sup>2</sup>

Figure 1: Framework of the Analysis



In this simpler model, consumers in the representative country in the economic bloc are characterized by the individualistic social utility function

$$(13) \quad U_B = [nC_{BB}^\beta + (N-n)C_{RB}^\beta]^{\frac{1}{\beta}},$$

---

<sup>2</sup> See Goto and Hamada (1996) for a detailed discussion of this point.

where  $U_B$  is the utility of the representative country in the economic bloc, and  $C_{BB}$  and  $C_{RB}$  are, respectively, the amounts of consumption of each type of bloc good and rest of the world (ROW) good in the representative country in the economic bloc. Consumers maximize their utility subject to the budget constraint

$$(14) \quad P n C_{BB} + (1 + t) (N - n) C_{RB} = Y_B ,$$

where  $P$  is the producer price of the goods produced in a country in the economic bloc, which is the same as consumer price within the bloc because no tariffs are imposed by the bloc country on bloc goods. The producer price of the goods produced in the rest of the world is set to unity as a numeraire. Since tariff  $t$  is imposed on the ROW good, the consumer price of the ROW good in the bloc country is  $(1+t)$ .  $Y_B$  is the national income of the representative country in the economic bloc.

Maximizing the utility in equation (13) subject to budget constraint (14), we obtain

$$(15) \quad \left[ \frac{C_{BB}}{C_{RB}} \right]^{1-\beta} = \frac{(1+t)}{P} .$$

On the other hand, the consumers of the representative country in the rest of the world are characterized by the individualistic social utility function

$$(16) \quad U_R = [nC_{BR}^\beta + (N - n - 1) C_{fR}^\beta + C_{hR}^\beta]^{\frac{1}{\beta}} ,$$

where  $U_R$  is the utility of the representative country in the rest of the world, and  $C_{BR}$  is the amount of consumption of each type of bloc good in the representative country in the rest of the world.  $C_{fR}$  is the imported amount of each type of ROW good, and  $C_{hR}$  is the amount of the

home good consumed in the representative country in the ROW. Consumers maximize their utility subject to the budget constraint

$$(17) \quad (1+t) P n C_{BR} + (1+t)(N-n-1) C_{fR} + C_{hR} = Y_R .$$

Note that in the representative ROW country, bloc goods as well as imported ROW goods are subject to tariff  $t$ .

Solving the utility maximization problem in the above, we obtain

$$(18) \quad \left[ \frac{C_{fR}}{C_{BR}} \right]^{1-\beta} = P ,$$

$$(19) \quad \left[ \frac{C_{hR}}{C_{fR}} \right]^{1-\beta} = 1 + t ,$$

and

$$(20) \quad \left[ \frac{C_{hR}}{C_{BR}} \right]^{1-\beta} = P (1+t) .$$

Further, from the world market clearing conditions for bloc goods and ROW goods, we have

$$(21) \quad n C_{BB} + (N-n) C_{BR} = 1 ,$$

and

$$(22) \quad n C_{RB} + (N-n-1) C_{fR} + C_{hR} = 1 .$$

Since the trade has to be balanced in equilibrium, we have

$$(23) \quad P C_{BR} = C_{RB} .$$

By Walrus's law, one of the above eleven equations is redundant. So, ten independent equations determine ten endogenous variables ( $U_B$ ,  $U_R$ ,  $Y_B$ ,  $Y_R$ ,  $C_{BB}$ ,  $C_{RB}$ ,  $C_{BR}$ ,  $C_{fR}$ ,  $C_{hR}$ , and  $P$ ).

Now, let us suppose that a country, say, Greece is admitted to the economic bloc (e.g., European Community). Since Greece's pre-accession level of export to the EC is  $C_{RB}$  and its post-accession export level is  $C_{BB}$ , we can evaluate the impact of the Greece accession on its export to the EC by examining the following index of the change in exports ( $CE$ ), which is defined as<sup>3</sup>

$$(24) \quad CE \equiv \frac{C_{BB}}{C_{RB}} .$$

First, let us examine how  $CE$  is affected by different values of  $t$ . By repeated substitution using equations (15), (18)-(23), we can derive the following equation.

$$(25) \quad \begin{aligned} & n(C_{RB}^{-1} - n)^{-\frac{1}{\beta}} C_{RB}^{\frac{1}{1-\beta}} [(N-n-1) + (1+t)^{\frac{1}{1-\beta}}]^{\frac{1}{\beta}} \\ & + (N-n)(C_{RB}^{-1} - n)^{-\frac{1-\beta}{\beta}} C_{RB}^{\frac{1}{1-\beta}} [(N-n-1) + (1+t)^{\frac{1}{1-\beta}}]^{\frac{1-\beta}{\beta}} \\ & = 1 . \end{aligned}$$

Although equation (25) looks very complicated, we can notice the following:

- (i) In order for the equation to hold,  $(C_{RB}^{-1} - n)$  must be positive;
- (ii) Left-hand side (LHS) is a monotonically increasing function of  $t$ ;
- (iii) LHS is a monotonically increasing function of  $C_{RB}$ ;

---

<sup>3</sup> Exactly speaking, this statement may not be entirely correct, because we are neglecting the impact of the new accession on  $C_{BB}$ . By assuming that the newly admitted country is small, we are implicitly assuming that  $C_{BB}$  is not changed by the admission. While we add this assumption in the theoretical analysis here for algebraic simplification, we use a full-fledged model (i.e., variable  $C_{BB}$ ) in the simulation exercise.

(iv) Right-hand side (RHS) is constant.

From (i) to (iv), it is clear that if equation (25) is to hold with equality, larger a value of  $t$  must be accompanied by a smaller value of  $C_{RB}$ . Thus, we proved the following condition:

$$(26) \quad \frac{\partial C_{RB}}{\partial t} < 0 .$$

Similarly, by manipulating the equilibrium conditions, we obtain

$$(27) \quad n C_{BB} + (N - n) C_{BB}^{1-\beta} C_{RB}^{\beta} (1+t)^{-1} = 1 .$$

By inspecting equation (27), we can notice the following:

- (i) LHS is a monotonically decreasing function of  $t$  ;
- (ii) LHS is a monotonically increasing function of  $C_{BB}$  ;
- (iii) LHS is a monotonically increasing function of  $C_{RB}$  ;
- (iv) RHS is constant.

Hence, from (26), and (i) - (iv), it is clear that if equation (27) to hold with equality, larger values of  $t$  must be accompanied by the larger values of  $C_{BB}$ . In other words, we must have the following condition:

$$(28) \quad \frac{\partial C_{BB}}{\partial t} > 0 .$$

From (26) and (28), it is clear that we have

$$(29) \quad \frac{\partial CE}{\partial t} > 0 .$$

Thus, we have proved the following proposition:

***Proposition 1: The degree of increase in exports from a newly admitted member to the old members of trade bloc is larger when the initial trade barriers were larger.***

In other words, proposition 1 means that, for example, when Greece is admitted to EC (and when EC tariffs on the goods coming from Greece are lifted), Greek exports of heavily protected products before integration increase more than those of less protected products.

Second, let us examine the relationship between  $CE$  and the degree of product differentiation, which can be measured by the elasticity of substitution ( $\sigma$ ). Since we have

$$(30) \quad \sigma = \frac{1}{1 - \beta} ,$$

in order to examine the magnitude of the impact of degree of product differentiation ( $\sigma$ ) on  $CE$ , all we have to do is to determine the sign of  $(\partial CE / \partial \beta)$ , because  $\sigma$  is a monotonically increasing function of  $\beta$  for the range of  $0 < \beta < 1$ . Note that higher a value of  $\beta$  means a smaller degree of product differentiation.

First, manipulating the above equilibrium conditions, we can show

$$(31) \quad \frac{\partial P}{\partial \beta} < 0 .$$

Inequality (31) means that the price markup of bloc goods over ROW goods is smaller, when the degree of product differentiation is weaker. From (31) and (15), it is clear that a larger value of  $\beta$  must be accompanied by a larger value of  $(C_{BB} / C_{RB})$ . Hence, we have

$$(32) \quad \frac{\partial CE}{\partial \beta} > 0 .$$

Thus, we have proved the following proposition:

***Proposition 2: The degree of increase in exports from a newly admitted member to the old members is larger when the degree of product differentiation is smaller.***

In other words, proposition 2 means that when Greece is admitted to EC (and when EC tariffs are lifted on goods coming from Greece), exports of less-differentiated (i.e., more homogeneous) products tend to increase more than those of highly differentiated products.

Taken together, the above two propositions imply that the impact of regional integration on agricultural trade is likely to be stronger than that on manufacturing trade, because the agricultural trade is heavily protected and because agricultural products are, generally speaking, less differentiated than manufacturing goods, as discussed in Section II.

#### ***IV. The Impact of EC Expansion and Trade Flows – An Ex Post Analysis***

##### ***(A) Theoretical Predictions***

In the last section, we developed a simple framework for the analysis of the impact of regional integration, and derived two propositions concerning the magnitude of the impact of regional integration on trade flows. The two propositions predict that regional integration has varying degrees of impact on various commodities and/or various countries, depending on two key parameters, i.e.,  $t$  (degree of protection) and  $\sigma$  (degree of product differentiation). When country  $A$  and country  $B$  are united together, the amount of trade between the two countries increases, at the expense of trade with outside country  $C$ , more rapidly than it would if initial



trade barriers were bigger and/or if the product in question were less differentiated. In other words, when product  $X$  is subject to high tariff and/or when the degree of product differentiation among types of product  $X$  is relatively low, then the trade flows shift more in favor of member countries. In such a case, regional integration could be characterized as *trade-diverting* rather than *trade-creating*.

Generally speaking, agricultural products are subject to heavier trade barriers than manufacturing products (high  $t$ ), and the former are less differentiated than the latter (large  $\sigma$ ), as discussed in Section II. Therefore, according to the theoretical analysis above, the impact of regional integration would be more conspicuous for agricultural trade than for manufacturing trade. Also, regional integration would have different magnitudes of impact on different categories of agricultural products, depending on  $t$  and  $\sigma$  of each product category.

In what follows, we will examine whether the above hypothesis is supported by the actual change in trade flows after regional integration. We will examine the change in trade flows, taking two cases of EC expansion as examples: the accession of Greece to EC in 1981 and the accession of Spain and Portugal to EC in 1986. We examine the change in trade flows in these two cases, because they are clear cases of the expansion of a trading bloc, and because sufficient time has elapsed for the full impact of the regional integration to be revealed. Note that NAFTA was signed in 1993 but aims to realize free trade by 2009, and that the APEC has just agreed to achieve a free trade regime by 2010 for developed country and by 2020 for developing countries.

## **(B) *Agricultural Trade and Manufacturing Trade***

To check the validity of the above theoretical predictions, let us examine whether there is a substantial increase in agricultural trade between new member(s) and old members of the economic union after the economic union is expanded. Since the price and quantities of commodity trade fluctuate widely every year, I will use the share figures, rather than raw figures, to eliminate the effect of universal fluctuations. When we look at the data on the change in trade flows at the two cases of EC expansions, it seems that the above theoretical predictions are generally supported by the data.

First, let us examine the impact of the accession of Greece to the EC in 1981. Figure 2 plots the EC9's (the original eight EC members plus Greece) imports from Greece as a share of its total imports for both agricultural products and manufacturing products. As Figure 2 shows, until Greece joined the EC in 1981, the Greek share in EC's agricultural imports stayed consistently around 0.6 percent, with no increasing trend. However, as soon as Greece was admitted to EC membership, this share began to increase dramatically, and it was more than double the pre-accession level by the end of the 1980s. Such a remarkable increase in the share of intraregional trade cannot be observed for manufacturing trade, however. In fact, the Greek share in EC9's manufacturing imports has been declining since the end of the 1970s.

The share of imports from EC9 in total Greek imports shows similar trends. As depicted in Figure 3, as soon as Greece was admitted to EC in 1981, the share of EC9's agricultural products in Greece's total agricultural imports jumped to 56 percent in 1981 from 31 percent in 1980. The share continued to increase, to more than 70 percent in the 1990s. On the other hand,

Figure 2  
EC9

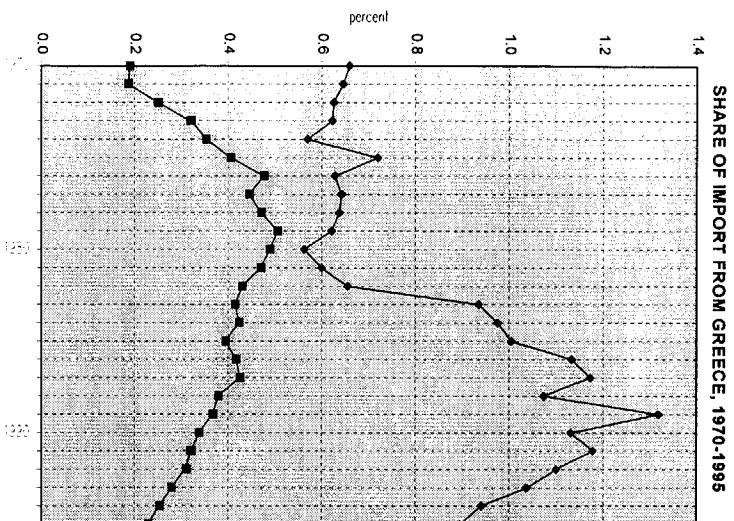
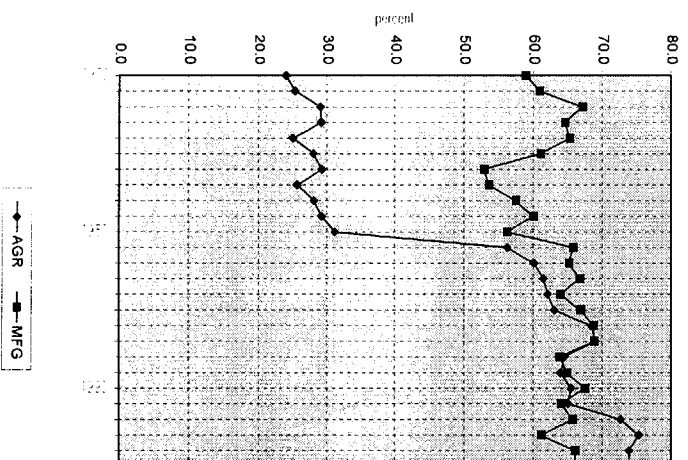


Figure 3  
GREECE  
SHARE OF IMPORT FROM EC9, 1970-1995



the EC9's share in total manufacturing imports by Greece has stayed aroundt 60 percent, and there is no sign of increase.

Second, let us examine the situation when Spain and Portugal joined the EC in 1986. Figures 4 to 6 show a similar trend. Figure 4 plots the share of EC10's products in total imports by Spain for both agricultural product and manufacturing product. As the figure shows, while the share of EC10's agricultural products in total agricultural imports by Spain was around 20 percent until Spain was admitted to EC in 1986, the share shows a big jump after the accession. By the end of the 1980s, the share more than doubled to become about 50 percent of Spain's total agricultural imports. On the other hand, there is no increasing trend for manufacturing products. Figure 5 shows very similar trends for the share of EC10's products in Portugal's imports. However, the share of imports from Spain and Portugal in total imports by EC10 shows increasing trends in both agricultural and manufacturing product (see Figure 6), and we can observe a significant jump in the share of agricultural trade after 1988.

To test somewhat rigorously the above statement based on figures 2 to 6, we performed a *t*-test for difference in mean, the result of which is summarized on Table 7. The procedure of the *t*-test was as follows. First, we calculated the average share over 10 years before the accession and that after the accession for each case. Second, I calculated the difference in means for each case, and ran a *t*-test for each case to see whether the difference in mean is statistically significant. As Table 7 shows, the difference in mean for agricultural trade is significant even at 0.1 percent level for all four cases. In other words, the intraregional intensity of agricultural trade after integration is higher, with clear statistical significance, than that before integration. On the other hand, as for manufacturing trade, EC9's manufacturing import (case 1) and

Figure 4  
SPAIN

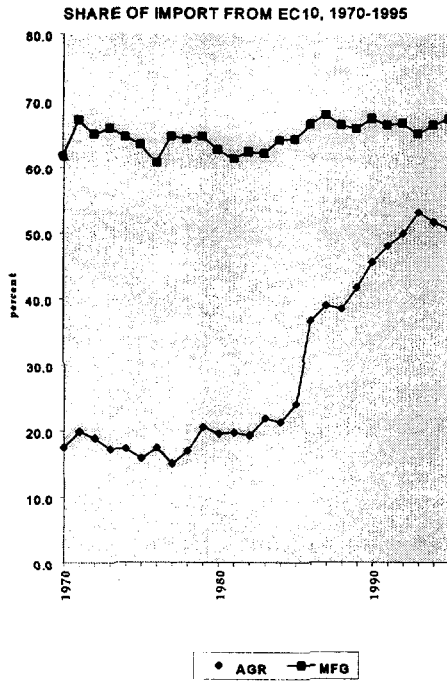


Figure 5  
PORTUGAL

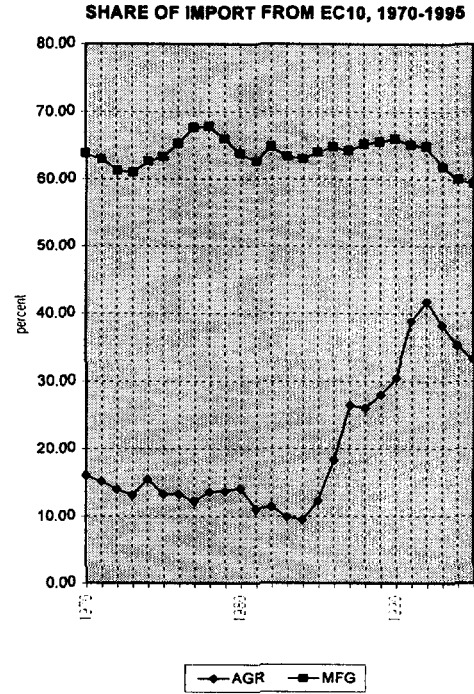


Figure 6  
EC10  
SHARE OF IMPORT FROM SPAIN AND PORTUGAL, 1970-1995

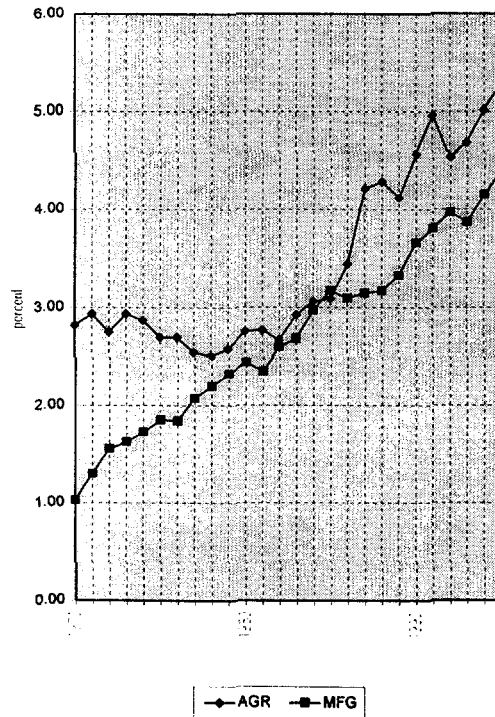


Table 7: Test for Difference in Means

EC9's IMPORT FROM GREECE (Case 1)							
	Value 1971-80 Average	(\$MIS) 1981-90 Average	Share 1971-80 Average before	(%) 1981-90 Average after	Difference	t-statistics	
Agriculture	439.51	2,240.1	0.62728	1.00018	0.3729	5.13836	A
Manufacturing	874.25	3,458.94	0.39025	0.40596	0.01571	0.43097	
GREECE'S IMPORT FROM EC9 (Case 2)							
	Value 1971-80 Average	(\$MIS) 1981-90 Average	Share 1971-80 Average before	(%) 1981-90 Average after	Difference	t-statistics	
Agriculture	251.98	1,486.58	28.0235	63.5014	35.4778	26.0782	A
Manufacturing	2,151.31	4,901.78	59.9696	66.2924	6.32284	3.835	B
EC10'S IMPORT FROM SPAIN AND PORTUGAL (Case 3)							
	Value 1976-85 Average	(\$MIS) 1986-95 Average	Share 1976-85 Average before	(%) 1986-95 Average after	Difference	t-statistics	
Agriculture	2,691.47	7,863.8	2.72996	3.51329	0.78333	4.33583	A
Manufacturing	8,005.94	32,637.9	1.89638	3.01757	1.12119	4.63569	A
IMPORT OF SPAIN AND PORTUGAL FROM EC10 (Case 4)							
	Value 1976-85 Average	(\$MIS) 1986-95 Average	Share 1976-85 Average before	(%) 1986-95 Average after	Difference	t-statistics	
Agriculture	1,122.49	6,887.01	16.8723	27.5678	10.6955	4.50586	A
Manufacturing	9,108.58	46,442.5	64.2141	64.7192	0.50513	0.7957	

Note: A: Significant at 0.1 percent level

B: Significant at 1 percent level

manufacturing import by Spain and Portugal (case 4) are not significant at all, although it is significant for case 2 and case 3.

These findings seem to support our general statement that regional economic integration has a greater impact on agricultural trade than on manufacturing trade, probably because agricultural goods are subject to higher trade barriers and are less differentiated.

### ***(C) Varying Magnitude of the Impact of Regionalism on Different Agricultural Products***

In the above subsection, we have found that agricultural trade flows are influenced by regional economic integration more than is manufacturing trade. The question, then, is whether regional economic integration has a different degree of impact on different agricultural products? Figures 7 to 10 address this question. In the figures, the shares of trade between old and new member(s) of the EC before and after the new members are integrated are plotted. Although the magnitude of the impact varies from case to case as well as from commodity to commodity, it seems that the impact of regional integration on trade flows of meat, cereal, animal feeding stuff, oil and fat is stronger than it is on fish, fruit and vegetables, beverages and tobacco, etc. Although the figures on the degree of product differentiation are not available, commodities with a larger impact seem to be less differentiated than those with a smaller impact. For example, the degree of product differentiation seems to be smaller for animal feeding stuff, oil and fat, etc., while beverages, which include French wine and German beer, appear to be highly differentiated.

Figure 7  
THE SHARE OF EC9'S IMPORT FROM GREECE  
BY COMMODITY BEFORE AND AFTER INTEGRATION

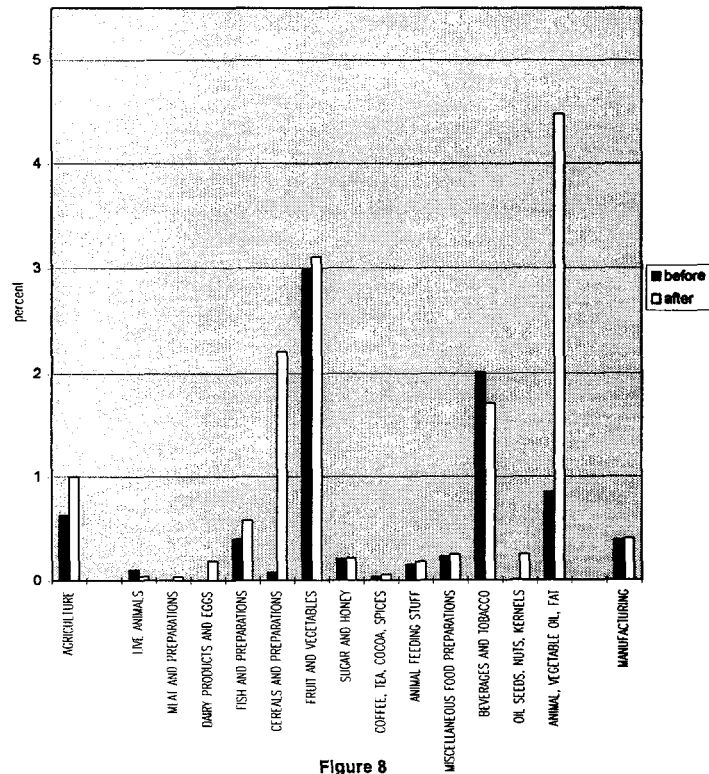
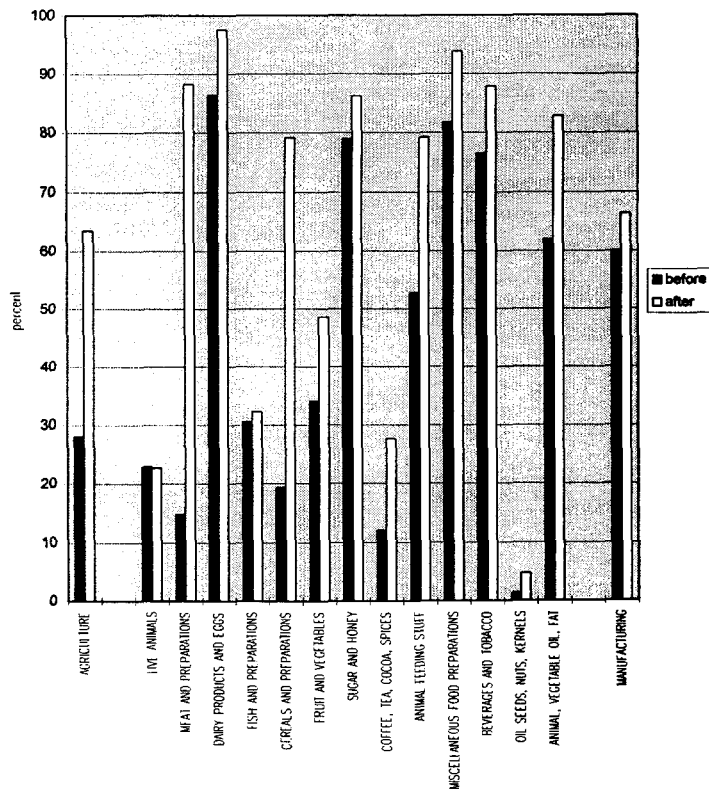
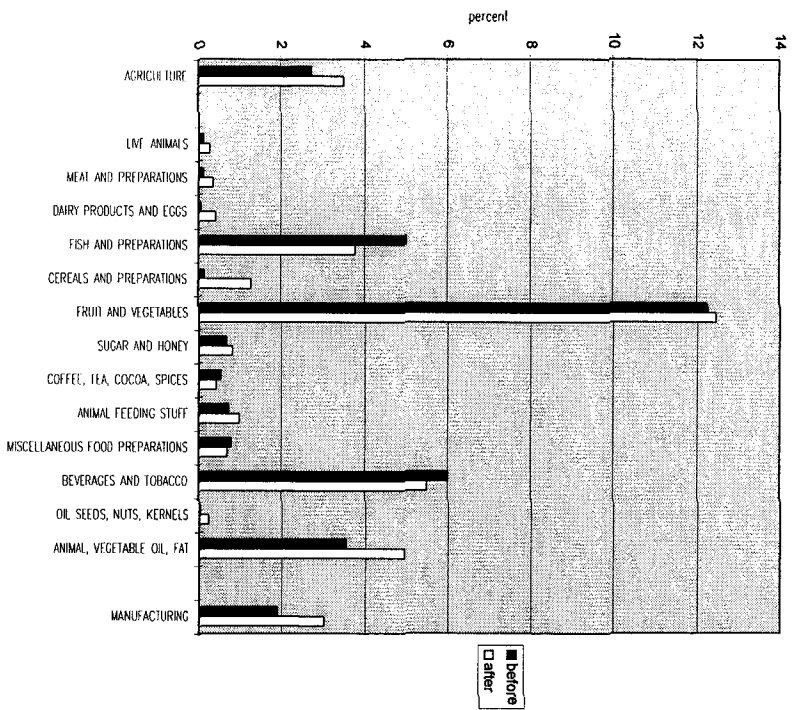


Figure 8  
SHARE OF GREECE'S IMPORT FROM EC9  
BY COMMODITY BEFORE AND AFTER INTEGRATION

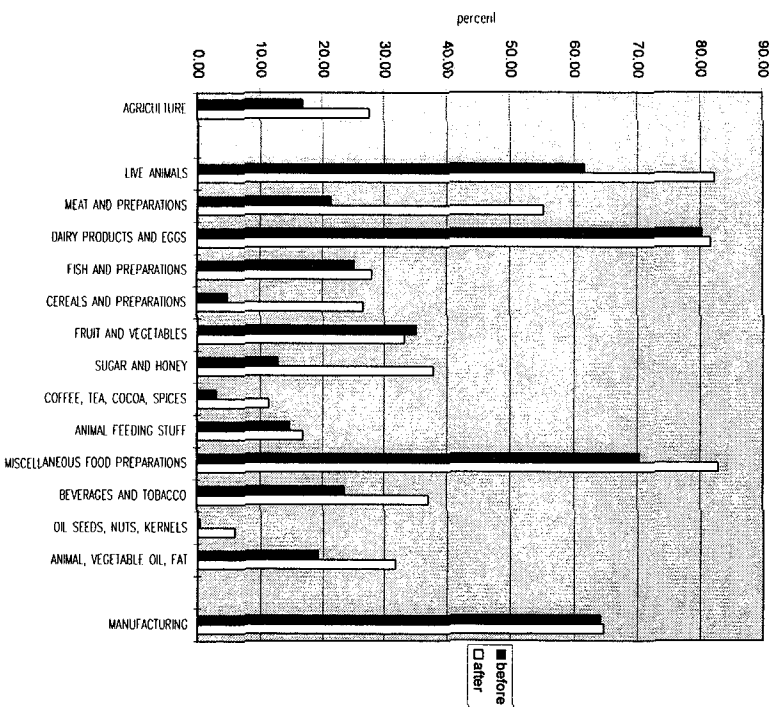




**Figure 9**  
**SHARE OF EC10'S IMPORT FROM SPAIN AND PORTUGAL**  
**BY COMMODITY BEFORE AND AFTER INTEGRATION**



**Figure 10**  
**SHARE OF IMPORT OF SPAIN AND PORTUGAL FROM EC10**  
**BY COMMODITY BEFORE AND AFTER INTEGRATION**



#### **(D) *Who Lost the Share?***

Needless to say, when the share of trade between old EC members and new EC member(s) increases, the share of some other countries declines. In other words, the increase in intraregional trade after regional integration occurs at the expense of trade with some other regions. To see which countries were adversely affected when old and new EC member(s) increased trade intensity among themselves, let us examine the change in the share of trade with non-EC members. Figures 11 to 15 summarize the result. Intra-EC trade of agricultural products has tended to increase substantially, while the increase in manufacturing products is not so obvious. On the other hand, the agricultural trade with North America (notably with the United States) declined substantially in all four cases. This gives some clue as to why the conflict between the EC and the United States was so severe during agricultural negotiations under the Uruguay Round. In addition to North America, African countries also seem to have been adversely affected by the increased intensity of the intra-EC trade of agricultural products.

#### **(E) *Comparison with Other Regions***

Finally, let us compare the increasing tendency toward intraregional trade of agricultural product in Europe with that in other regions, such as North America and Asia. Figure 16 shows, that the share of intraregional trade of agricultural product has been increasing in Europe, as the EC has expanded its membership and deepened the degree of integration.

However, such a trend does not seem to be universal. As Figure 17 shows, in Asia the intraregional share of agricultural product has not increased at all. In North America, as shown in Figure 18, although the share of the intraregional trade of agricultural product shows some

FIGURE 11  
EC9: SHARE OF IMPORT BY REGION BEFORE AND AFTER INTEGRATION

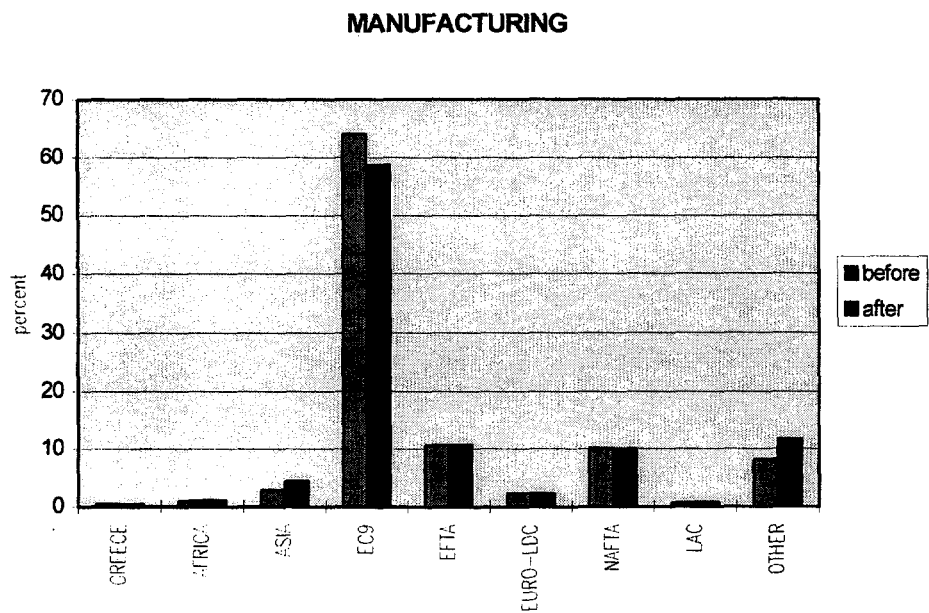
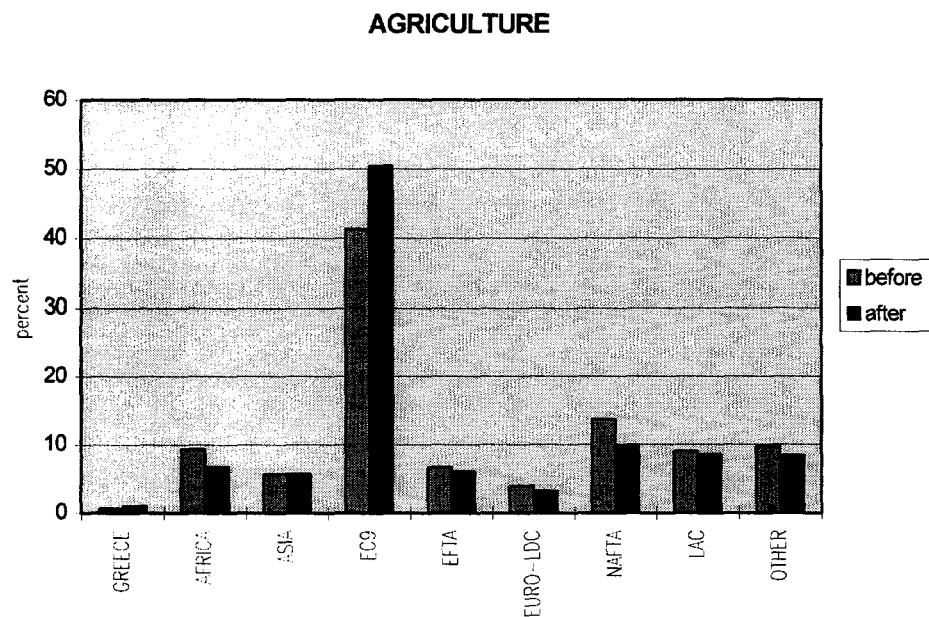


FIGURE 12  
GREECE: SHARE OF IMPORT BY REGION BEFORE AND AFTER INTEGRATION

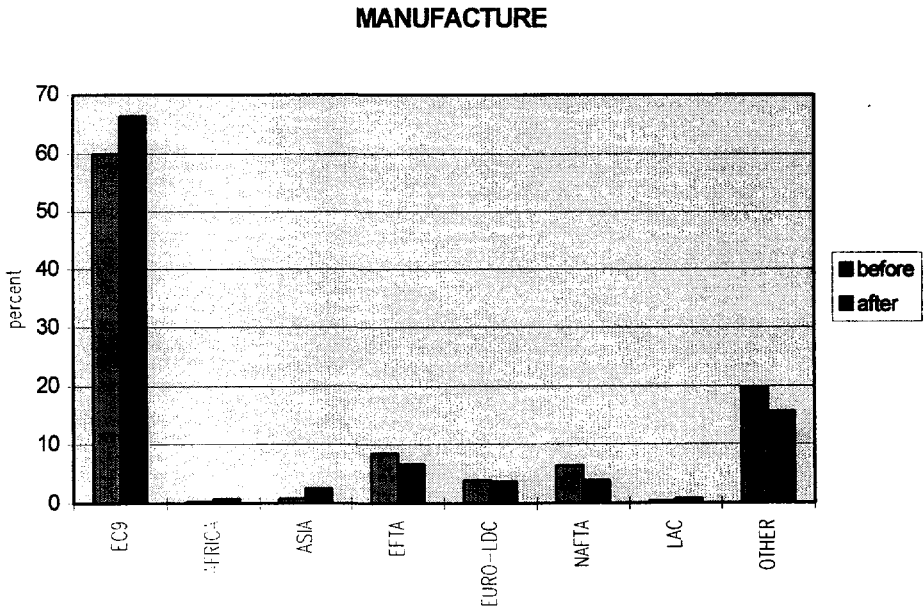
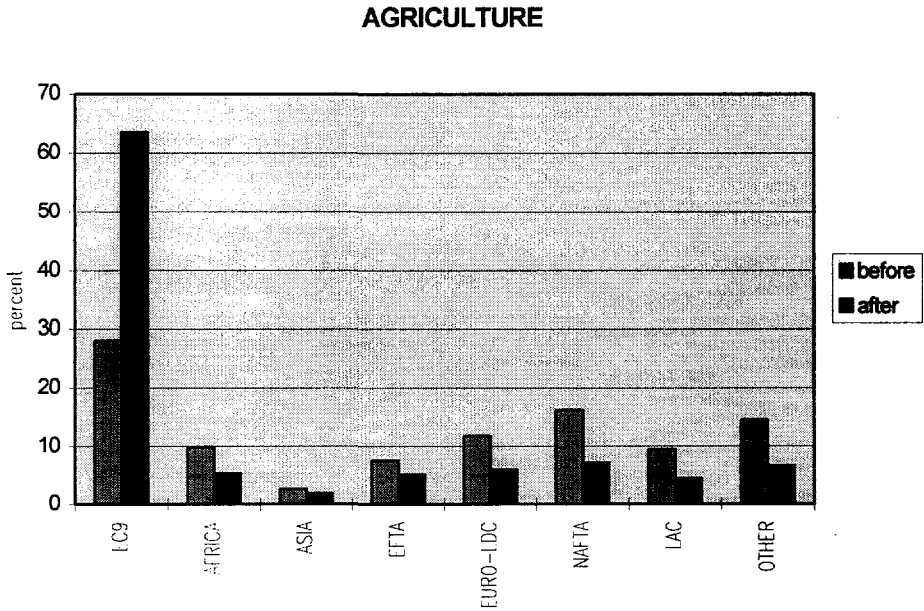
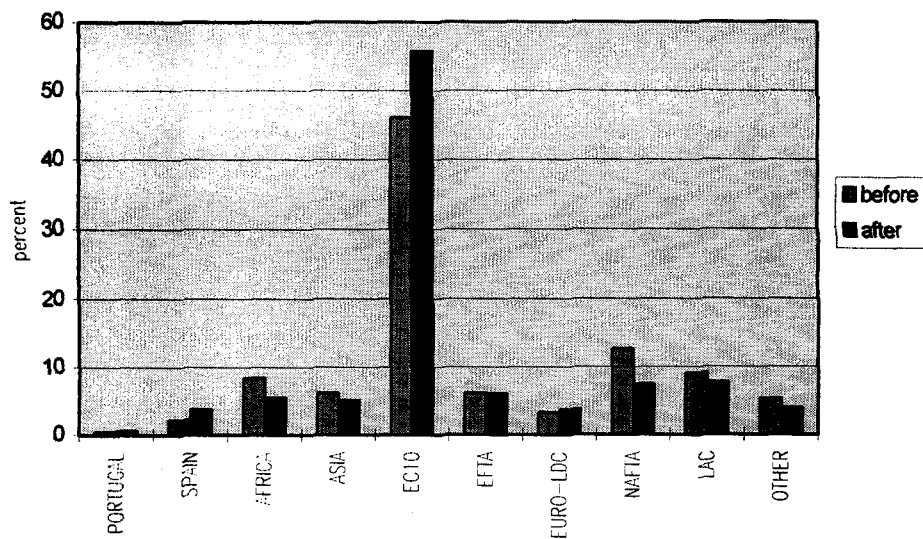
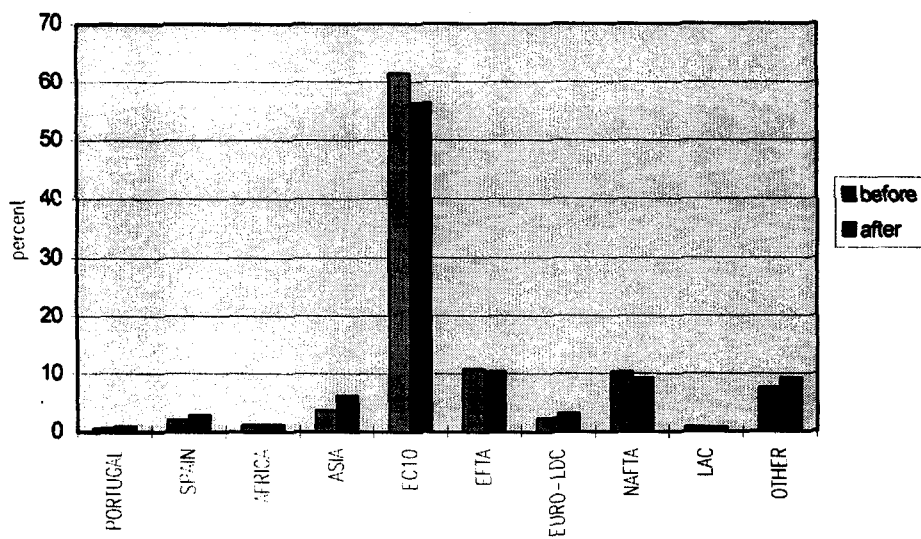


FIGURE 13  
EC10: SHARE OF IMPORT BY REGION BEFORE AND AFTER INTEGRATION

AGRICULTURE

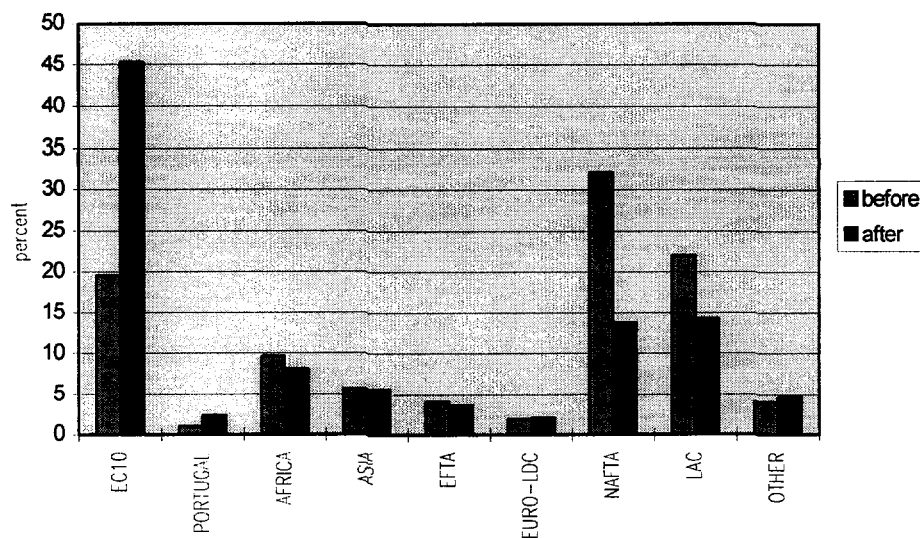


MANUFACTURE

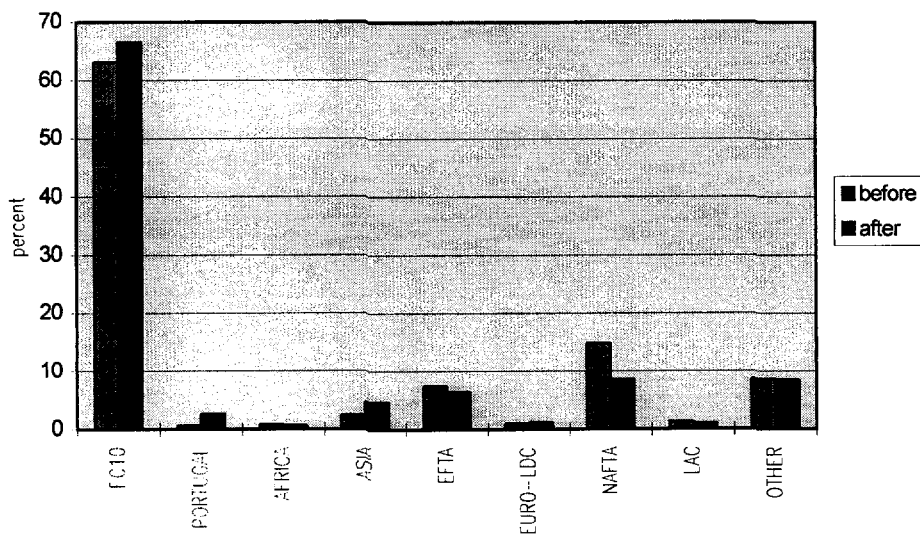


**FIGURE 14**  
**SPAIN: SHARE OF IMPORT BY REGION BEFORE AND AFTER INTEGRATION**

**AGRICULTURE**

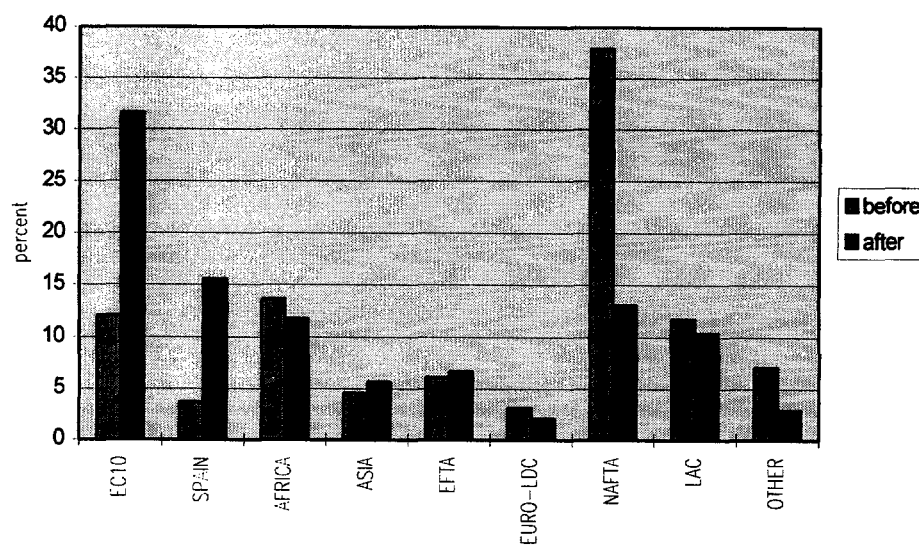


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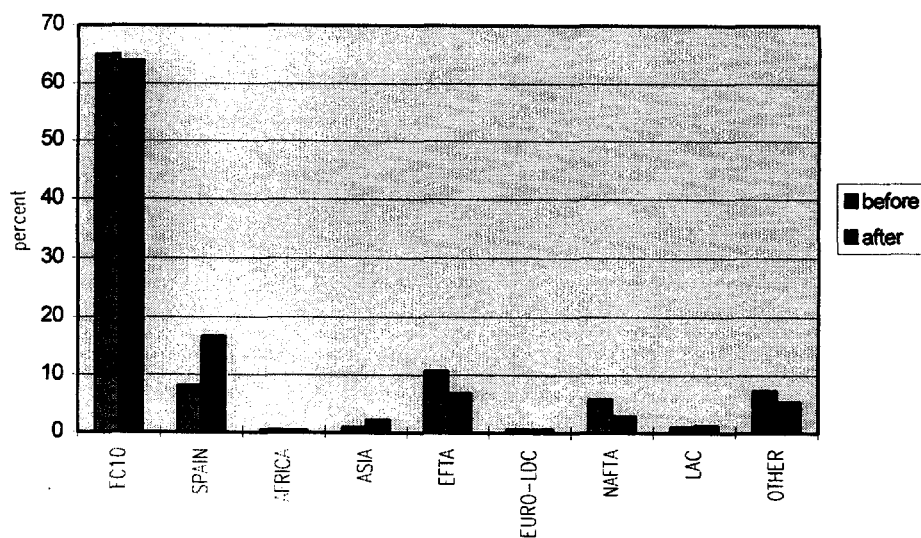


**FIGURE 15**  
**PORTUGAL: SHARE OF IMPORT BY REGION BEFORE AND AFTER INTEGRATION**

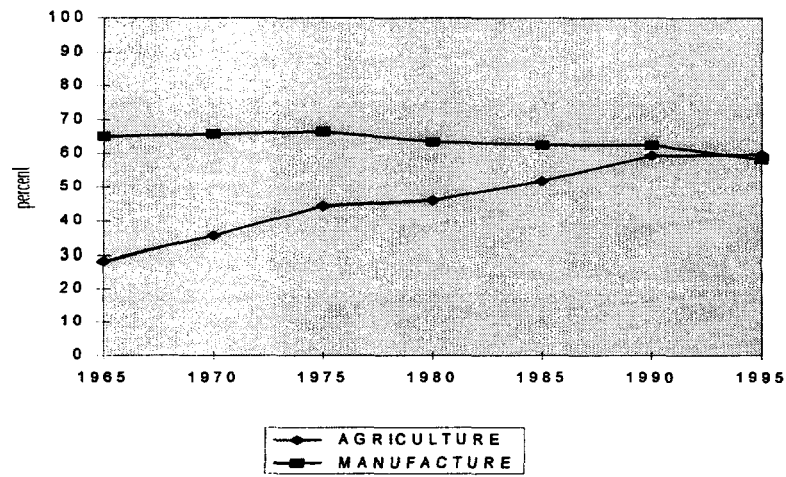
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**MANUFACTURE**



**Figure 16**  
**EC12: SHARE OF INTRAREGIONAL TRADE, 1965-1995**



**Figure 17**  
**APEC ASIA: SHARE OF INTRAREGIONAL TRADE, 1965-1995**

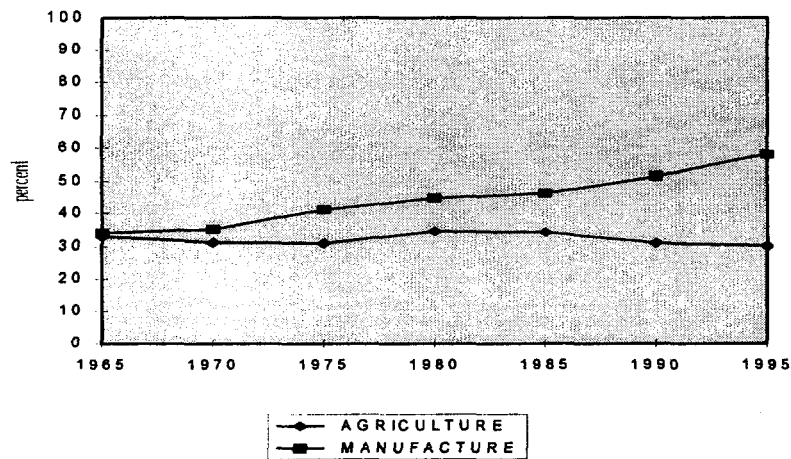
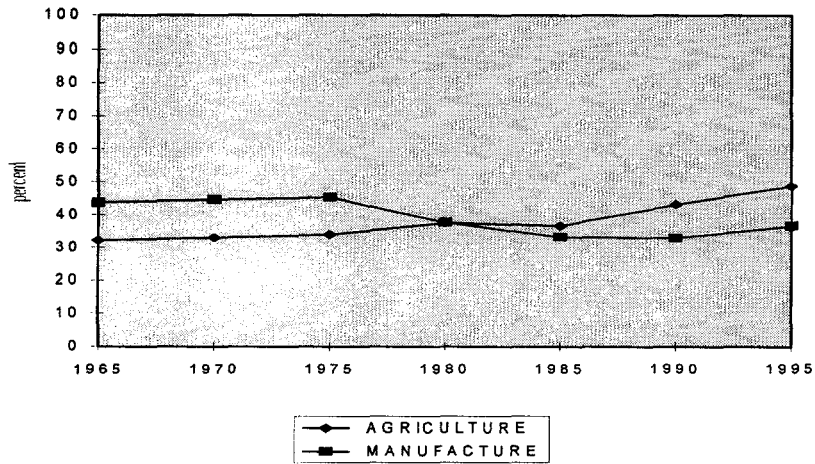




Figure 18  
NORTH AMERICA: SHARE OF INTRAREGIONAL TRADE, 1965-1995



increase after 1980, the magnitude is much smaller than that in Europe. Note that while European integration has been making progress both in coverage and in depth for many years since the establishment of the EC, comparable development toward regional integration has not been observed in Asia and North America until very recently. Probably time is needed before any such progress can be identified in these regions.

#### ***V. Regional Integration and Japanese Rice Imports – An Ex Ante Analysis***

In this section, we will conduct an *ex ante* analysis of the effect of regional economic integration on agricultural trade flows. Using the framework developed in Section III, we will

examine the impact of APEC-wide free trade agreement on rice imports by Japan, one of the most heatedly debated issues in that country in recent years. The Japanese people are very sensitive to imported rice, and due to the almost total control by the government, the price of rice in Japan is about six times higher than the price on the international market. Because of the huge gap between the price of Japanese rice and the international price, many people in Japan fear that opening up the Japanese rice market would almost wipe out rice production in Japan. The Japanese government adamantly resisted the pressure for liberalization during the Uruguay Round negotiation, and did not accept the tariffication of imports of foreign rice into Japan. Instead, Japan only promised a minimum opening to foreign rice of four percent of domestic consumption (379 thousand tons) in 1995, which will gradually increase to eight percent (758 thousand tons) by the year 2000.

In addition to global liberalization under the Uruguay Round, Japanese rice producers face another challenge. In 1994, leaders of the APEC countries agreed that in order to achieve free trade in the region, developed and developing countries in the APEC area will implement the free trade by 2010 and 2020, respectively. This might cause a serious threat to Japanese rice producers because the share of APEC production in total world rice production is more than 50 percent and APEC includes major rice exporters such as Thailand, the United States, China, and Australia.

Thus, it is feared that if Japan accepts free import (or even preferential import) of rice from APEC countries, the liberalization will have a profound impact on the Japanese rice market. In spite of the importance of the issue, there are few, if any, formal studies that examine the likely impact of an APEC free trade arrangement on the Japanese rice market, and therefore the

argument on the issues is often emotional. The following simulation is intended to fill the gap to some extent, even though the estimation is preliminary and depends on various simplifying assumptions.

#### **(A) *Rice Market in Japan***

Before going to the simulation exercise, let us briefly discuss the salient features of the rice market in Japan.

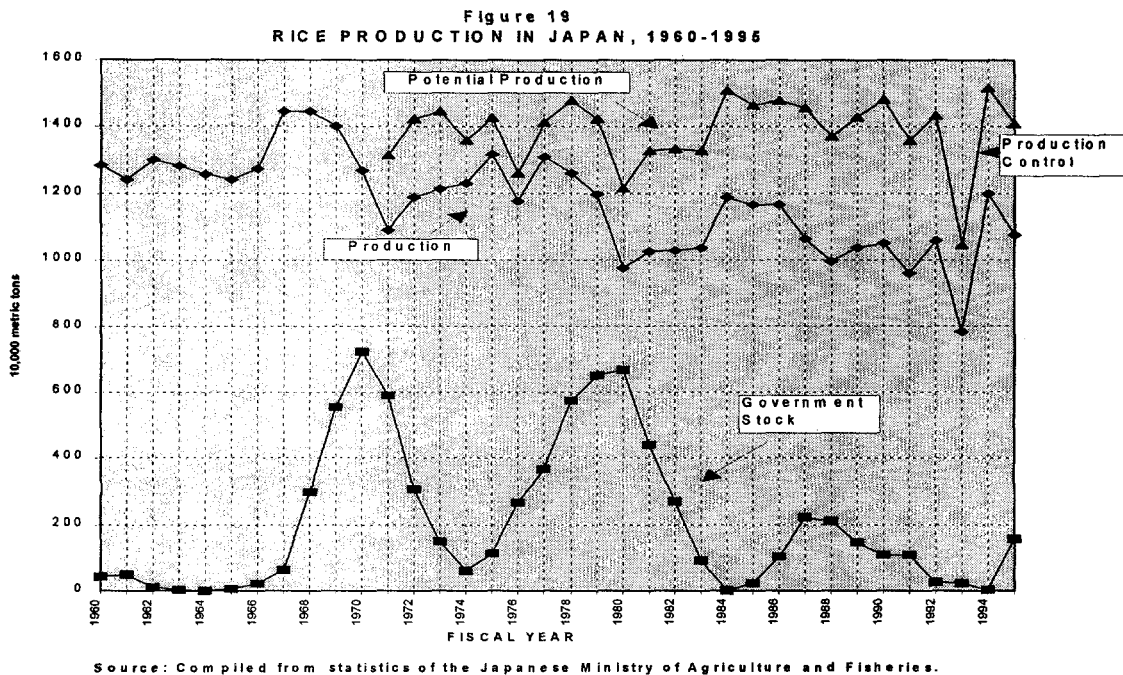
Until November 1995<sup>4</sup>, the production, distribution, and pricing of rice were totally controlled by the government under the Food Control Act of 1942, which had been enacted to cope with the severe food shortage during World War II. Under that law, the government announced the estimated total rice consumption in Japan every year. In order to satisfy the estimated demand, the government decided on the amount of rice to purchase from each local unit, which in turn decided how much to purchase from each farmer. Since farmers had an obligation to sell rice to the government, the planned purchase amount constituted the limit on rice production. The purchasing price from farmers and selling price to consumers was also decided by the government every year. Until the new law was enacted in 1995, only licenced wholesalers and retailers were allowed to handle the distribution of rice (i.e., it was *illegal* for regular supermarkets to sell rice).

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<sup>4</sup> In November 1995, the new Food Law was put into effect. Although the new law was intended to deregulate the Japanese rice market, imported rice is still almost totally controlled by the government.

Although the initial purpose of the Food Control Act of 1942 was to protect consumers from severe food shortage during the war, it gradually changed into an income support program for farmers. As urban workers achieved double-digit annual wage increases during the high economic growth of the 1960s, the Basic Agriculture Act was enacted in 1961, with the major purpose of narrowing the income gap between the rural and urban sectors. As a result, rice prices were raised rapidly to provide farmers with an income equivalent to that of urban workers. In early 1960s, the price of the Japanese rice (25 cents per kilogram) was not very different from the price on the international market (19 cents per kilogram), but by the end of the 1980s the former (1.98 dollars) had become more than six times higher than the latter (30 cents).

Obviously, the rapid increase in the domestic price of rice encouraged production and discouraged consumption. As a result, the stockpile of rice in Japan grew dramatically in the late 1960s. Figure 19 shows the actual and potential production level and the amount of the stockpile of rice in Japan since 1960. As shown in the figure, in the late 1960s the amount of unsold rice in Japan exceeded 7 million metric tons, which was more than half the annual production. Faced with this huge stockpile, the government began exporting rice (at the much cheaper international price) or gave it away as official development assistance. In addition, in order to cope with the long-term overproduction, the government initiated production controls in 1971. By various measures, such as subsidy and punishment, the planned production control has been strictly enforced. As a result, the actual amount of production has almost always been the same as the planned amount. As Figure 19 shows, the difference between potential and actual production since 1980 has been around 30 percent of actual production. In short, through strict



government control, the high price of the Japanese rice has been maintained, and production controls have been strictly enforced to avoid overproduction.

As mentioned at the beginning of this section, recently the Japanese rice market has been changing. In compliance with the Uruguay Round agreement, the government was obliged to give up the policy of "no single piece of foreign rice in Japan," and in 1995 it imported (379,000 metric tons) an amount of foreign rice equal to four percent of domestic consumption. This is to increase to 758,000 metric tons by the year 2000. Although the government successfully avoided tariffication of rice, the opposition by farmers to the abolishment of the "no foreign rice policy" was enormous. Since such an opening up of the rice market is expected to lead to a lower price for rice (and therefore to the decline in farmers' incomes), the government also in the

same Diet session that ratified the Uruguay Round agreement, appropriated more than 6 trillion yen (about 60 billion U.S. dollars) to increase farmers' incomes. This 6 trillion yen is not for a direct cash payment to the farmers; it is intended to increase farmers' income indirectly through various measures including improving the infrastructure in rural areas, enhancing agricultural technology, making loans available to farmers, etc.

Under the new Food Law, the government gave up total control of rice distribution, and rice distributed outside of government control was legalized. However, the import of rice is still under almost total control of the government. With a minor exception called the SBS (simultaneous buy and sell) formula<sup>5</sup>, only the government can import foreign rice. When the government buys foreign rice, it is allowed to impose a surcharge of up to 292 yen per kilogram of imported rice when the government sells it in the Japanese market. Since the surcharge of 292 yen per kilogram is equivalent to a 779 percent surcharge, the government can, in effect, raise the price of foreign rice sold in Japan as much as it wishes. Note that when the full 292 yen surcharge is imposed, the price of foreign rice becomes 2.64 dollars per kilogram, which is even higher than the current price of domestic rice (1.98 dollars per kilogram). Thus, even under the Uruguay Round agreement and the new Food Law, the government can set the price of government-distributed rice, both domestic and foreign, at whatever level it wishes.

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<sup>5</sup> Under the SBS formula, the importer and wholesaler file a joint application to the government, in which they have to specify the buying price of the importer from the foreign producer and the selling price of the importer to the domestic wholesaler. The government allocates the import quota to the application with the biggest gap between the buying price and selling price, and the difference goes to the government. SBS imports are limited to about ten percent of total rice imports in Japan.

## **(B) APEC and Japanese Rice – An Illustrative Simulation**

### **(i) Basic Simulation Strategy**

Now, let us examine the impact on the Japanese rice market when the government gives up control of the quantity of rice imports. In this hypothetical case, the government controls the price of foreign rice in the Japanese market only through tariffs, while it can still control the price of domestically produced rice. The simulation is conducted using the product differentiation model developed in Section III, in view of the fact that rice is a fairly differentiated product in Japan, as discussed in Section II. More specifically, the following maximization problem is solved to examine the impact of the APEC free trade agreement on the Japanese market, which is the adapted version of equations (1) and (2) in Section III. In other words, the objective function of the utility maximization problem of the Japanese consumers is

$$(33) \quad U = [n_d q C_d^\beta + n_a C_a^\beta + n_r C_r^\beta]^{\frac{1}{\beta}}, \quad 0 < \beta < 1, \quad ,$$

where  $C_d$ ,  $C_a$ , and  $C_r$  are the consumption of each type of domestically produced rice, rice produced in APEC countries, and rice produced in the rest of the world, respectively. Note that  $C_a$  and  $C_r$  are also the amounts of import of each type of rice from APEC and from the rest of the world. Also note that  $n_d$ ,  $n_a$ , and  $n_r$  are the number of types of domestically produced rice, rice imported from APEC countries, and rice imported from the rest of the world, respectively.  $U$  is the utility of the Japanese consumers, and  $q$  is the quality premium index of domestically produced rice, which is discussed in detail below.

Japanese consumers maximize their utility subject to the budget constraint

$$(34) \quad P_d n_d C_d + P_a (1+t_a) n_a C_a + P_r (1+t_r) n_r C_r = Y, \quad ,$$

where  $P_d$ ,  $P_a$ , and  $P_r$  are the price of each type of domestically produced rice, rice imported from APEC country, and rice imported from the rest of the world, respectively. In the equation  $t_a$  and  $t_r$  are the tariff rate imposed on the import of rice from APEC and the rest of the world, respectively, and  $Y$  is the amount of income available to spend on rice purchase.

When we identify the parameters  $n_d$ ,  $n_a$ ,  $n_r$ ,  $q$ ,  $P_d$ ,  $P_a$ ,  $P_r$ ,  $Y$ ,  $t_a$  and  $t_r$ , we can solve the model for the welfare maximizing amount of consumption of each type of rice ( $C_d$ ,  $C_a$ , and  $C_r$ ). Then, to examine the magnitude of the impact of the APEC free trade agreement on the Japanese rice market, all we have to do is obtain, by simulation, the values of  $C_d$ ,  $C_a$ , and  $C_r$  for reduced values of  $t_a$ , and compare them with corresponding values with no tariff concessions. Needless to say, when the rice imports from APEC countries are totally liberalized,  $t_a$  becomes zero.<sup>6</sup>

## ***(ii) Identification of Parameter Values***

Using data from Food and Agriculture Organization (FAO), we obtained  $P_a=0.38$  (dollar price per kilogram of rice) and  $P_r=0.38$ . For the price of the domestic rice, we adjusted the price of domestic rice in the year 2000 by taking into consideration the recent slight decline in buying price by the government, and we obtained  $P_d=1.92$ . In other words, the producer price of domestic rice is five times higher than foreign rice even in the year 2000. Using statistics from the Japanese Ministry of Agriculture and Fishery, we obtained a total buying price for domestic rice of  $Y=19,479$  (million dollars). While actual data are available for  $P_d$ ,  $P_a$ ,  $P_r$ , and  $Y$ , other

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<sup>6</sup> Since total liberalization of such a sensitive agricultural product in Japan is unlikely, the effects of various levels of tariff reductions, as well as the case of zero tariff, are simulated below.



parameters have to be calculated indirectly. For example,  $n_d$  is obtained by dividing the amount of total production of rice in Japan by the number of brands of rice listed in the Annual White Paper of the Ministry of Agriculture and Fishery<sup>7</sup>, i.e.,  $n_d=21$ , and  $n_a (n_r)$  is obtained by dividing the amount of total exports of rice from APEC countries by the average amount of production of domestic rice.

In view of the fact that the capacity to export is constrained by the need to feed its own population, we assumed that the amount of rice which could potentially be brought into the Japanese market was limited to the amount already in the international market in 1990-95. Therefore, the calculation of  $n_a$  and  $n_r$  was based on the amount of exports rather than on the amount of total production, and we obtained  $n_a=19$  and  $n_r=17$ .

The value of  $q$  (quality premium index of domestic rice over foreign rice) was the most difficult to identify. To obtain this figure we used FAO statistics to calculate the price of rice imported by Japan (56.8 cents per kilogram) and the price of rice imported by Asian developing countries (36.3 cents per kilogram) in 1994, when Japan imported a fairly large amount of rice in order to cope with a possible shortage due to its poor harvest. Thus, the price of rice brought into Japan is 56.5 percent higher than average in the (undistorted) international market. In addition, we tried to incorporate the unpopularity of foreign rice even at the substantially cheaper prices during emergency import in 1994 (due to inferior quality because of foreign objects like stone

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<sup>7</sup> The brands of rice below the cut-off point in production (15,000 ha) are omitted from the calculation.

chips, lack of stickiness, etc.); and, somewhat arbitrarily, we squared the price difference in 1994 to obtain  $q^8$ .

$$(35) \quad q = \left[ \frac{56.8}{36.3} \right]^2 = 2.45 \quad .$$

For the value of  $\beta$ , we used 0.6, which was used in Goto and Hamada (1996); they in turn based their figure on the estimate by R. Stern, J. Francis, and B. Schumacher (1976). Since  $\beta=0.6$  is not a decisive number, we conducted sensitivity analysis using different values of  $\beta$ , as reported in the appendix. A brief look at Table 20 and two appendix tables reveals that the thrust of the argument in the next subsection is quite insensitive to variations of  $\beta$ .

We calculated  $t_a$  and  $t_r$  as the tariff rates which keep the import of rice at the agreed minimal access level (758,000 metric tons) in 2000, and obtained  $t_a(t_r)=5.80$ . In other words, to keep the amount of foreign rice at the minimum access level (8 percent of domestic consumption), Japan has to impose a 580 percent tariff on foreign rice.

### ***(iii) Result of Simulation***

Now that we have equations for optimization problem and all the parameter values needed, we can simulate how the trade liberalization under the APEC agreement affects the rice market in Japan. Let us look at the upper panel of Figure 20, which summarizes the simulation

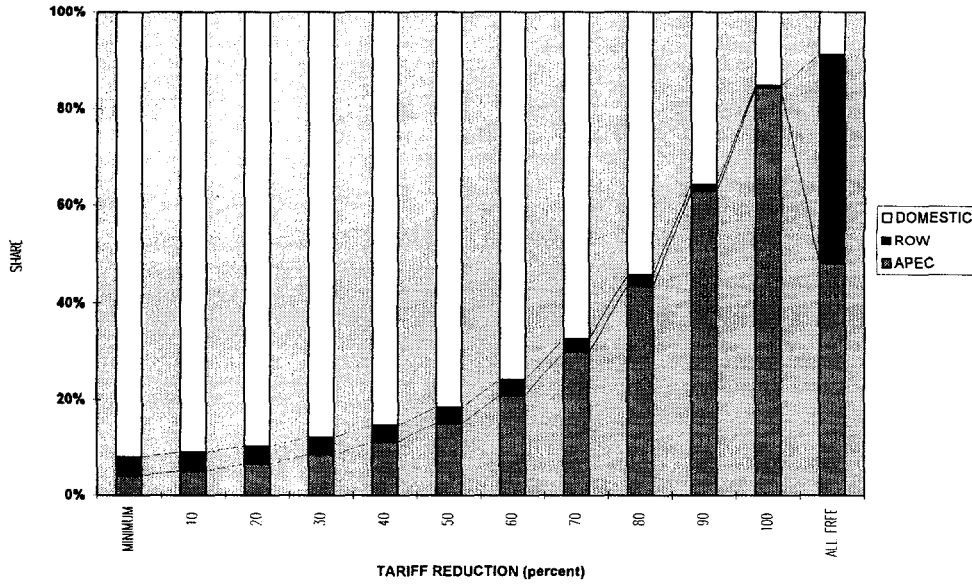
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<sup>8</sup> Incidentally, in March 1997, the author checked the retail price of different brands of rice at supermarkets in the Washington metropolitan area, and found that "California Rose Rice," which is similar to Japanese rice, was 4.49 dollars per 5 pounds, while the price of standard rice was 1.99 dollars per 5 pounds. Thus, even in the United States, where protection on rice is minimal, Japanese-like rice can command a much higher price than standard rice, probably because of the quality difference. The price ratio of California Rose Rice to standard rice in Washington was 2.26 (= 4.49/1.99), which is more or less similar to the above estimate for  $q$  (=2.45).

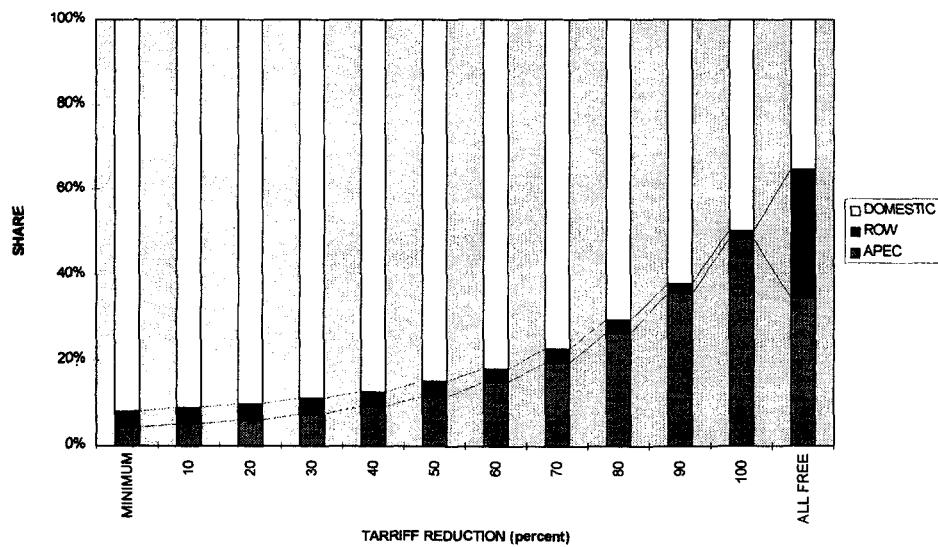
Figure 20

# Impact of APEC FTA on the Japanese Rice Market

NO PRICE REDUCTION ( $\beta = 0.6$ )



PRICE REDUCTION ( $\beta = 0.6$ )



results. Horizontal axis plots the degree of trade liberalization under the APEC free trade agreement. "Minimum" means the tariff rate to keep foreign rice at the minimum access level (758,000 metric tons). In order to keep foreign rice at this level, the government has to impose 580 percent tariff on imported rice. "10%," "20%," .... means the situation where the initial tariff (580 percent) imposed on APEC rice is reduced by "10%," "20%," and so forth. When the initial tariff on APEC rice is reduced by 10 percent (20 percent), the new tariff rate becomes 522 percent (464 percent), and so forth. "ALL FREE" means the situation where tariffs imposed on foreign rice, both APEC and non-APEC rice, are totally abolished.

Keeping the above in mind, let us examine the simulation result. Contrary to the popular argument in Japan, the impact of preferential liberalization of APEC rice is not so large, although the completely free import of APEC rice has a big impact. As the figure shows, even if the minimum access tariff level (580 percent) is halved (290 percent), the share of imported rice increased by 10.4 percent to become 18.4 percent, although if total liberalization of the import of APEC rice is realized, the share of imported rice becomes as high as 84.8 percent. If the tariff reduction to APEC rice remains 10-30 percent, the impact on the domestically produced rice is minimal. For example, when tariff on APEC rice is reduced by 20 percent, the share of foreign rice in the Japanese market increases only by 2.3 percent to become 10.3 percent. Thus, the simulation result reported here, which is based on the product differentiation framework rather than the homogeneous product assumption, suggests that the impact of *partial* liberalization of rice imports from APEC countries is too small to wipe out the Japanese agriculture.

Further, note that the simulation result in the upper panel of Figure 20 is based on the assumption that the current high price of domestic rice is maintained without major change. However, since the mid-1990s, when the Japanese government gave up the policy of "no single

piece of foreign rice," support for the idea of maintaining farmers' income through excessively high prices seems to be fading a little. If the Japanese government can reduce the support price of domestically produced rice, the impact of a tariff reduction on APEC rice becomes smaller. The lower panel of Figure 20 shows the simulation result when the support price is halved from the benchmark price level used for the simulation in the upper panel. If the government succeeds in reducing the price of domestic rice by half, the tariff necessary to keep imported rice to the minimum access level is 240 percent. In this case, the impact of a 10-30 percent reduction of tariffs on APEC rice is minimal. Even when the tariff rate on APEC rice is reduced by 50 percent, the share of imported rice increases by a mere 7.1 percent to 15.1 percent. However, if the tariff on APEC rice is totally abolished, the market share of domestic producers is reduced to 50 percent.

Thus, according to the simulation result reported here, which incorporates product differentiation, the impact on Japan of partial liberalization of the rice market seems to be much smaller than feared.<sup>9</sup>

## **VI. Concluding Remarks**

By using a simple trade model with product differentiation, we have analyzed the impact of regional economic integration on agricultural trade, comparing it with the impact on manufacturing trade. Using the model developed in the paper, we have found that the degree of impact of the free trade agreement on trade flows depends on two key parameters: *degree of*

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<sup>9</sup> Appendices 1 and 2 suggest that the above result is rather insensitive to the different values of  $\beta$ .

*initial protection* ( $t$ ) and *degree of product differentiation* ( $\sigma$ ). The impact of the expansion of the FTA on agricultural trade flows tends to be larger than that on manufacturing trade because the initial protection level on agricultural trade is larger and because, generally speaking, agricultural goods are less differentiated than manufacturing goods.

Examining the data on the change in trade flows for two incidents of EC expansion, we have confirmed, at least to some extent, the validity of the theoretical prediction. When EC expanded, agricultural trade between the new member(s) and old members increased dramatically, while no comparable jumps were observed for the manufacturing trade. Further, among agricultural goods, the impact on certain products with less product differentiation, such as meat, animal feeding stuff, and fat, was stronger than the impact on more differentiated products such as fruits and vegetables and beverages.

After the *ex post* analysis, the model is applied to an *ex ante* analysis of the impact of the APEC Free Trade Agreement (FTA) on one of the most controversial commodities, rice in the Japanese market. Many people in Japan are arguing that if their rice market is opened up to foreign rice, Japanese rice production will be wiped out. In spite of this emotional argument, there have been very few, if any, objective studies on the impact of liberalization on the Japanese rice market. In view of this, one purpose of this study is to fill the gap by presenting an objective simulation result. The simulation result in this paper suggests that the impact will not be as large as many people fear.

It seems that the fear of liberalization emphasizes only one of the two parameters mentioned above; i.e., degree of initial protection. Of course, the impact of the APEC FTA on the Japanese rice market tends to be large because the current protection level on rice in Japan is

very high (the tariff equivalency of the protection on rice is more than 500 percent). However, it should be noted that in the Japanese market rice is a highly differentiated product, and consumers are willing to pay a high premium on certain brands of rice. As examined in the theoretical part of the paper, such a high degree of product differentiation tends to reduce the impact of the FTA on the domestic market. Thus, two conflicting forces determine the impact of the APEC FTA on Japanese rice imports. According to the simulation result, the overall impact of the partial liberalization is rather small, although the complete FTA has a profound impact on Japanese rice producers.

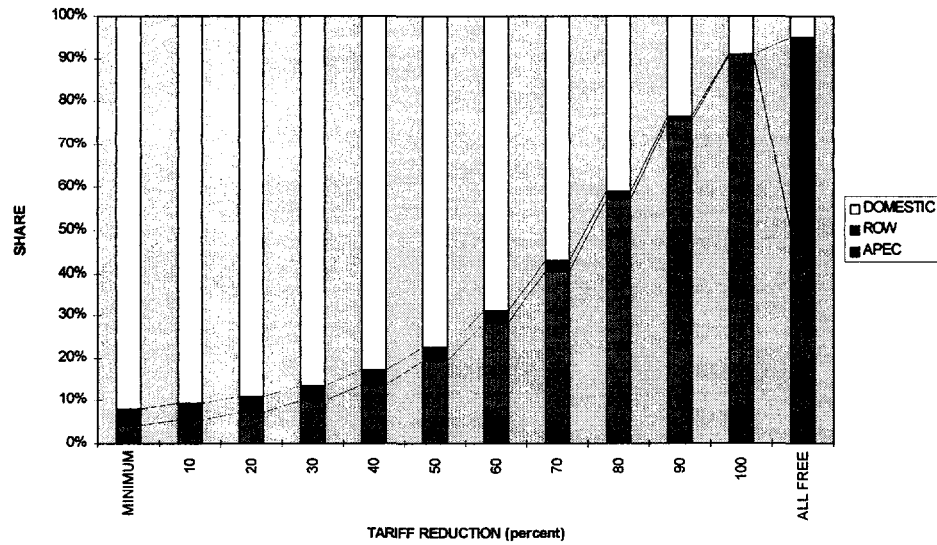
As mentioned above, the simulation result is still at a preliminary stage because it depends on various simplifying assumptions, such as the lack of adjustment by producers. Although we assumed in the simulation exercise that the quality of the Japanese rice is better than that of the imported rice, it is possible that foreign producers, could, in the long run, shift their production from current low-quality rice to high-quality, Japanese-like rice for export to the Japanese market. If that happens, the impact of the APEC FTA would become larger than the simulation result suggests. On the other hand, while the simulation result assumes that the current inefficiency in Japanese production continues, external pressure after the Uruguay Round will certainly push Japanese farmers to adopt larger-scale, more efficient production technology. If this happens, the impact of the APEC FTA on rice imports to Japan would be lessened by the strengthened competitiveness of the Japanese rice producers.

For all its imperfections, we hope that the present study is of some use in the objective discussion of agricultural trade policies in Japan and other countries.

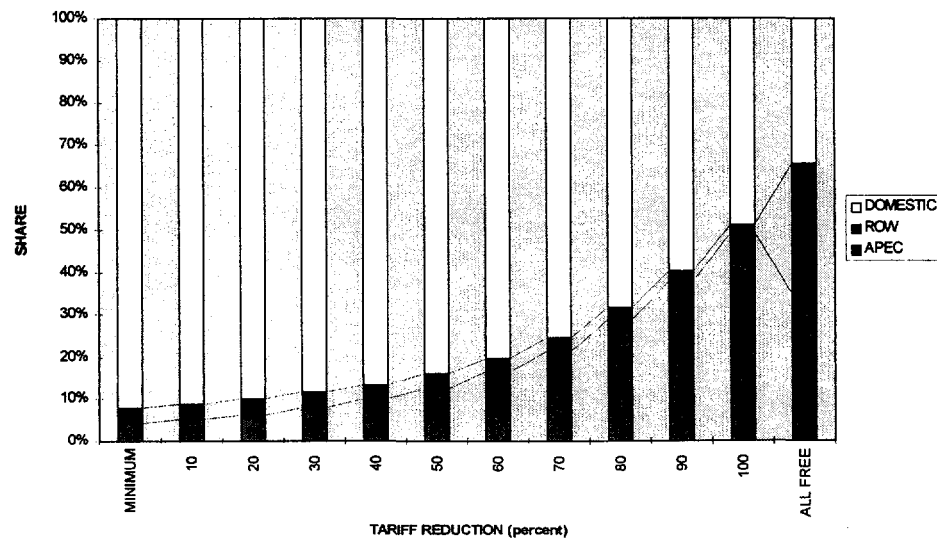
## Appendix 1

### Impact of APEC FTA on the Japanese Rice Market (Low $\beta$ Case)

NO PRICE REDUCTION ( $\beta = 0.7$ )



PRICE REDUCTION ( $\beta=0.7$ )

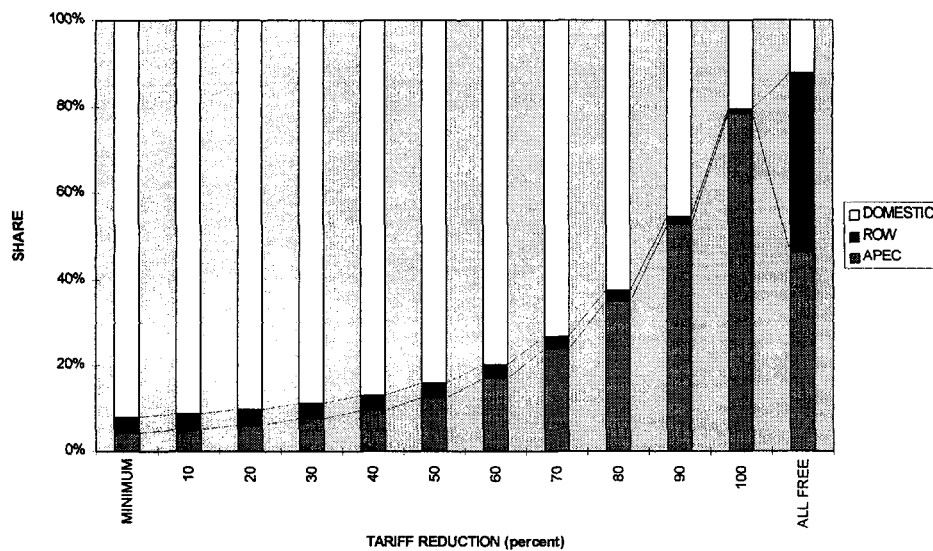




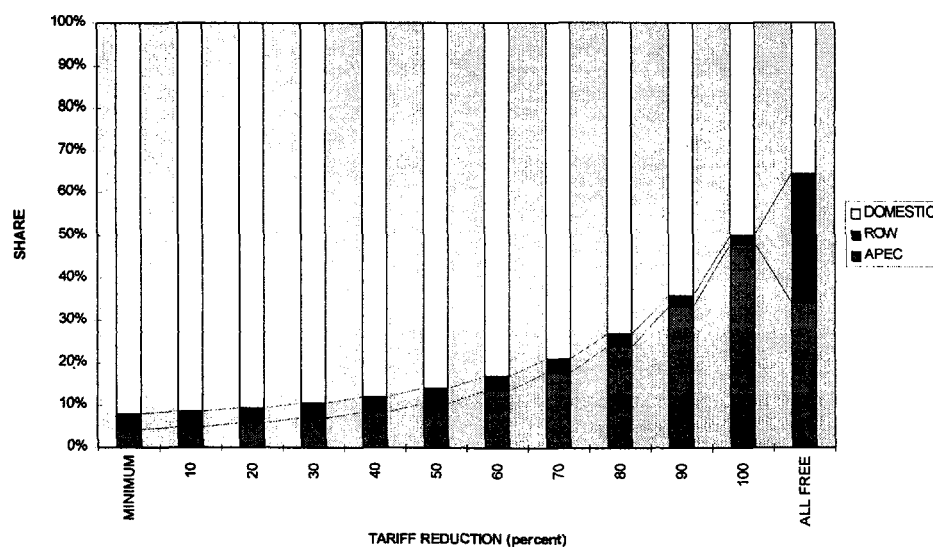
## Appendix 2

### Impact of APEC FTA on the Japanese Rice Market (High $\beta$ Case)

NO PRICE REDUCTION ( $\beta = 0.5$ )



PRICE REDUCTION ( $\beta=0.5$ )



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